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AUTOMOTIVE INDUSTRIES

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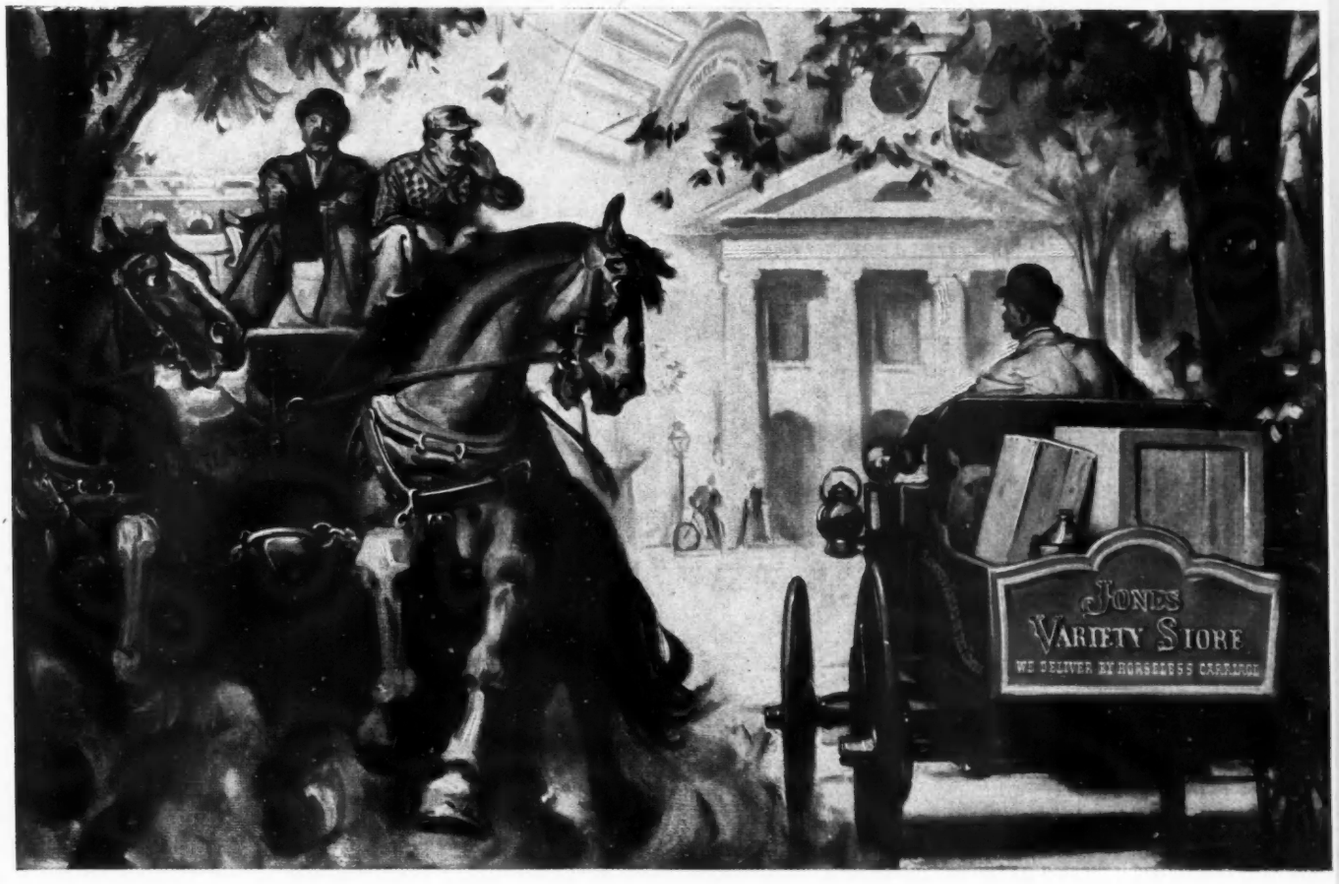
NOVEMBER 26, 1938



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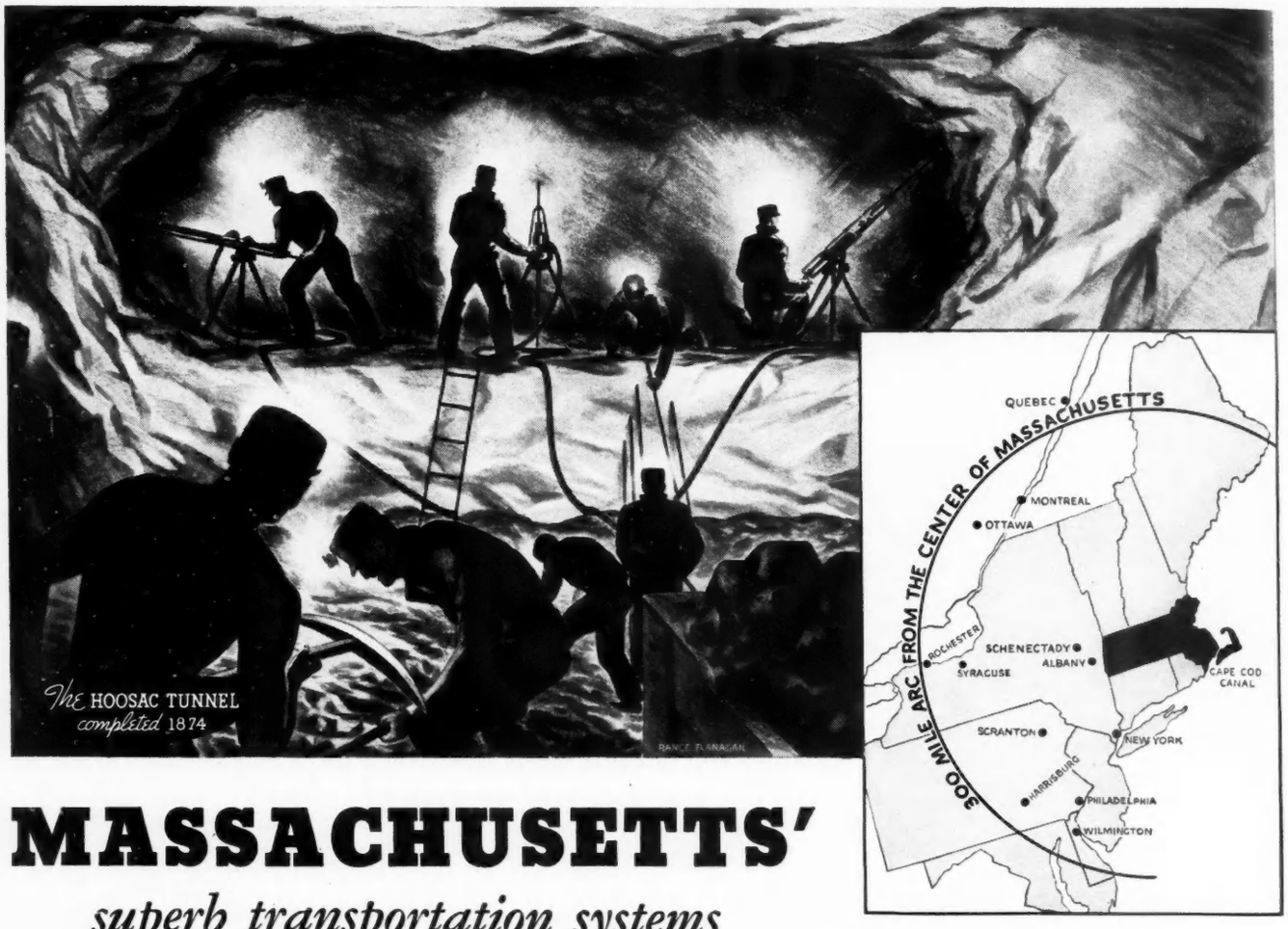

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 79 Number 22

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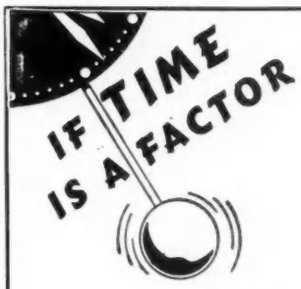

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They know it is read by those who directly or indirectly influence the buying in the industry, and is consequently the outstanding advertising medium for manufacturers who sell parts, accessories, materials or plant equipment to any or all branches of the automotive industry.

News of the *automotive world* is printed weekly in *Automotive Industries*

AUTOMOTIVE INDUSTRIES

A Chilton Publication

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Founded 1895

AUTOMOTIVE INDUSTRIES

Vol. 79, No. 22
November 26, 1938

News of the Industry

WAUKESHA MARINE

• Addition of two Waukesha-Hesselman marine engines to the Waukesha line signalizes the reentry of Waukesha into the marine field, after a number of years of inactivity in that direction. The first Waukesha engine was designed for marine use, and for 10 years after its introduction in 1906, the company was a factor in marine installations. Announcement of the Hesselman "Wanderer," which develops 250 max. hp. at 1050 r.p.m from a displacement of 1962 cu. in., begins the new Waukesha marine series.

DIESELS DESIRED

• "The steam engine is doomed to extinction and to be replaced by the Diesel electric locomotive." was the statement made by R. S. McLaughlin, president of General Motors of Canada, Ltd., Oshawa, Ont., while in attendance at the Motor Show in Montreal. Asked as to the practicability of using Diesel electric engines on Canadian railways. Mr. McLaughlin declared that a widely held illusion in that respect had been swept away. It was feared that they might find it difficult because of Canada's colder winter, but actual tests had shown that they operated much more efficiently than does the steam locomotive. This was due to lower weight and the fact that traction is developed on every wheel. "They cut through a drift of snow with ease, where a steam locomotive would meet with considerable difficulty," he remarked.

He declared that previous experiments with Diesel engines in Canada had not been successful because the type of Diesel then in use was not just what was required. "The new idea is a two-cycle engine. The old four-cycle engine did not come up to expectations. Both the weight and size have been reduced tremendously in the new two-cycle machine," he said. These engines are being produced by the Electromotive Corp. of La Grange, Ill., a subsidiary of General Motors Corp.

• Kansas City Terminal Railroad has ordered three Diesel-electric switching locomotives. Two will be built by the Electro-Motive Corp. and the third by the American Locomotive Co.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity
(Week Ending Nov. 26)

BUSES Output continues to average slightly below 50 per cent, however most producers seem optomistic of upturn in near future. Several large orders reported this week and indications of more to come shortly may cause upward revision of some schedules next week.

TRUCKS Producers still pleased with results of National Truck Show as inquiries continue. One large manufacturer stated it was operating at about 45 per cent, but looked for up-swing in the very near future.

TRACTORS One manufacturer resumed production this week on initial order of 800 units. The same company expects to begin production of its light tractors by the first of the year. This same time should find other producers more active.

AUTOMOBILES Production for the week is estimated at 81,000 units, with the month of November expected to account for more than 375,000 units. Sales reports continue well up and the current production rate. the highest daily rate for the year, is expected to be maintained through most of December.

MARINE ENGINES Situation remains unchanged with producers showing considerable interest in plans for the National Motor Boat Show scheduled for January.

AIRCRAFT ENGINES Still the envy of all other producers as peak output continues.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

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Production

Output Running Currently at Highest Daily Rate of Year

Car and truck production is running currently at the highest daily rate of the year and with continued favorable sales reports being received from the field it is expected that the present rate will at least be maintained through most of December.

Output for the week ending Nov. 26 was expected to be lower than that of preceding weeks only because the Thanksgiving Day holiday meant loss of a day's work in most instances, although some producers expected that their weekly total would not be affected particularly, in spite of the holiday. A preliminary check of factory schedules indicates that car and truck production for the week will total approximately 81,000 units.

Production for November to date is estimated at approximately 325,000 cars and trucks and with three full days still to go the month is expected to account for more than 375,000. With five full productive weeks still remaining in the year the current daily rate would permit production of at least 450,000 additional cars and trucks and, barring unforeseen develepoments, the total for the final quarter of 1938 should be slightly in excess of one million units.

General Motors divisions were expected to produce about 39,300 of the current week's total, followed by Ford, including Mercury and Lincoln-Zephyr with more than 15,000 and Chrysler divisions with approximately the same number. Hudson with close to 2000 cars for the week headed the independents followed by Studebaker, Packard and Nash.

One manufacturer of low priced cars reports three times as many unfilled orders on hand as a year ago at this time with 12,000 cars in dealers stocks as compared with 35,000 at this time last year.—J. A. L.

News of the Industry

PATENT POOLING

● The "use, distribution and pooling of patents" in the automobile and bottle glass industries will be the first subject to be considered by the Temporary National Economic Committee. It will be taken up after three-day introductory statements, beginning Dec. 1, are presented by Dr. Isador Lubin, Commissioner of Labor Statistics; Dr. William Thorp, Dun & Bradstreet economist attached to the Department of Commerce, and Leon Henderson, executive-secretary of the committee. The Government representatives will portray shifts in the "economic scene."

Senator O'Mahoney, chairman of the committee, commenting on the patent inquiry, said evidence will be submitted by the Department of Justice and subpoenaed witnesses to "show how control of patents affect the economic life of the country, favorably or unfavorably."

Declaring that all of the evidence won't be unfavorable, the Senator added that "we might easily show, for example, that some patent pooling isn't disadvantageous to the public."

Patents were chosen, he explained, "because that study has proceeded more rapidly to conclusion than others." He pointed out that the hearings will bring out under questioning "such restrictions as the owner of a patent may place on the use or the price of a product."

Consistent with a studied effort to allay business suspicion that it is entering upon a witch hunt, the committee unanimously adopted a resolution saying it will collect and analyze through reports and hearings available facts "in an objective, unbiased and dispassionate manner, and that it is the purpose of the committee to pursue its work solely from this point of view." Supplementing the resolution, O'Mhoney said that the hearings will be "not a recital of opinions, but of facts."

Speaking of the opening presentation by Government representatives, Secretary Henderson said:

"The economic presentation will undertake to provide a picture, not only as conditions are today, but economic growth over a long period. It will cover the performance record of American economy."

Henderson said the preview "will be pointed up to show the nature of the economic questions which will have to be answered before the committee is through with its work."

MONEY MATTERS

● The Goodyear Tire & Rubber Co. will call for redemption on Dec. 30, 1938, the entire issue of its First Mortgage and Collateral Trust 5 per cent bonds due May 1, 1957, and outstanding in the amount of $52,365,500, it was announced by P. W. Litchfield, president and chairman of the board.

Concurrently it was announced the company has completed arrangements to sell $40,000,000 twenty-year First Mortgage and Collateral Trust 3½ per cent bonds to insurance companies, which, together with a $10,000,000 five year bank credit at about 2¼ per cent, will represent the only funded debt of the corporation.

The 5 per cent bonds were originally issued in the amount of $60,000,000 in 1927 to refund higher coupon obligations. But the outstanding issue has been gradually reduced to its present level as result of purchases for a sinking fund.

With the present refunding operation the Goodyear Tire & Rubber Co. climaxes a financing program undertaken in 1936 to improve its financial structure.

● The United Specialties Co. reports an operating deficit of $73,865.77 for the first nine months of 1938. Heaviest losses were incurred by the company in the first six months of the year with August showing a few hundred dollars profit and September about $4000 loss.

● Chrysler Corp. and its subsidiaries made a net profit for the nine months ended Sept. 30, 1938, of $6,671,877.81, after all charges, equivalent to $1.53 a share. Sales amounted to $236,732,939.85 for the first nine months of this year.

● The tire industry paid $15,007,500 in federal excise tax on tires and $3,243,100 on tubes in the first nine months of 1938, including $5,721,900 on tires and $1,203,300 on tubes in the third quarter. In 1937 the industry's excise tax payments totaled $33,500,200 on tires and $6,587,700 on inner tubes.

● At a meeting of the directors of the Yellow Truck & Coach Manufacturing Co., a quarterly dividend of $1.75 per share was declared on the company's seven per cent cumulative preferred stock, payable Dec. 23, 1938, to stockholders of record Dec. 16, 1938.

CORK AND RUBBER ROAD

● A new safety road surfacing material made of cork and liquid rubber, will carry thousands of visitors at the New York World's Fair 1939, who will ride in new Ford, Mercury, and Lincoln cars over "The Road of Tomorrow," a feature of the Ford Building at the Fair. Called "Monocork," the new material will cover more than half a mile of elevated ramps upon which the cars will be demonstrated.

Canadian Production

As of Nov. 18, the Canadian motor car industry approached peak production for 1938 with prospects that new models rolling off the assembly lines would boost this year's business to almost the same level as 1937 and go still farther in 1939. As spokesmen for the industry predicted an upswing in sales for 1939, basing their outlook on more favorable business conditions, production of new-model units neared capacity in Ford Motor Co. of Canada, Ltd., and Chrysler Corp. of Canada, Ltd., plants at Windsor, Ont., and General Motors of Canada, Ltd., at Oshawa, Ont. The Ford plant, with a peak capacity of 100,000 units a year, prepared to better its 1938 production estimated at about 74,000 units.

Chrysler production on 1937 models was 39,691 units compared with 36,349 for the 1938 models. Production on the 1939 models started early in October, a month earlier than usual, in line with the industry's effort to level employment over a longer period each year.

Employment figures were reported as sharply higher. In the last six months General Motors of Canada recalled more than 5000 employes to work at factories in Oshawa, Windsor, St. Catherines, and Regina, bringing the total to the maximum of approximately 8000.

Automotive News from Tokyo

Unconfirmed Reports Indicate Japanese Production Boost Will Be Through Curtailment of American Car Output

Reviewing the automotive situation in Japan in a recent issue of the *Shoko Keizai*, organ of the Tokyo Chamber of Commerce and Industry, Dr. Kazuo Kumabe, professor at Tokyo Imperial University, quotes at length from reports published in AUTOMOTIVE INDUSTRIES, obviously refraining from publishing the results of his own investigations.

Doctor Kumabe predicts that within a few years motor-car registrations in Japan will reach 400,000 or even 500,000, which he says is not a big figure by American standards, but compares favorably with conditions in Germany and Italy.

Commenting on the official plan to quadruple the present productive capacity of Japanese plants, he says that it will be necessary to open up markets abroad in order to maintain the enlarged capacity on a paying basis. British India, South America, the South Seas and Australia are mentioned as the most promising territories for automobile exports.

Regarding the current demand for automotive vehicles, Doctor Kumabe reminds his readers that "certain" authorities a few years ago estimated the nation's future car demand at a "certain enormous" figure, but no one would believe them. The situation since the outbreak of the Sino-Japanese hostilities has fully justified this apparently extreme estimate, he adds.

According to the *Nippon Kogyo Shimbun*, 1939 production quotas for Nissan Jidosha and Toyota will be set at 20,000 and 15,000, respectively. The paper further learns that beginning from 1939 the Japanese branch plants of Ford and GM will have their quotas gradually cut down. The present quota for Ford is 12,360 cars, and that for GM, 9470 cars per year. From next year, the

quotas will be reduced pro rata to make a total of 18,000 cars, and in 1940 the combined quota will be down to 9000 cars. In 1941 the American firms will be allowed to assemble a maximum of 8000 cars, according to the paper.

AUTOMOTIVE INDUSTRIES' Tokyo correspondent was unable to obtain an official confirmation of this report, which seems hardly credible in view of the avowed intention of the Japanese Government to respect the vested rights of the foreign motor firms and to allow them to continue operations on the basis of their past production figures. An official statement issued in 1935 in connection with the promulgation of the Automobile Industry Control Law expressly emphasized that the measure was not designed to deprive the American firms of their market, but for the purpose of making the Japanese industry capable of meeting the natural increase in demand. This was understood to mean that the Americans were barred from further expansion, but that there was no objection to their continuing on the old scale.

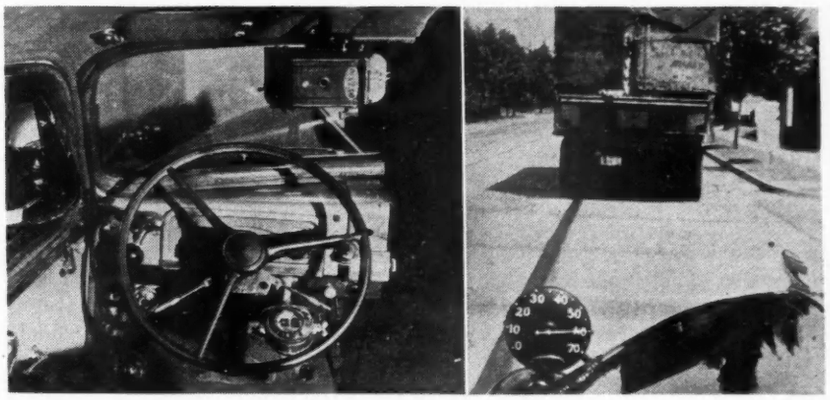
Sit-Down Study

Supreme Court to Decide Status of Strikers

Whether or not sitdowners cut themselves off from redress at the hands of the National Labor Relations Board will be determined by the Supreme Court. Last week the Court granted a petition of the Government to review a decision of the Seventh Circuit Court of Appeals in Lake County, Ill., which, by a two to one vote, set aside a board order requiring the Fansteel Metallurgical Corp., North Chicago, Ill., to reinstate 92 former employes, members of the Amalgamated Association of Iron, Steel and Tin Workers, CIO affiliate.

The Circuit Court, with Judge Walter E. Treanor dissenting, held that, regardless of the board finding that alleged refusal of the company to bargain with the workers caused the strike, the workers had violated the law by going on a sitdown strike, the company had the right to discharge them and they were barred from Labor Board relief.

The lower court issued an order calling for eviction of the strikers in February, 1937. They were notified by the management of their discharge while they occupied the plant. The plant was allegedly damaged by missiles and bombs thrown by strikers and equipment was sabotaged.



Acme photo

EVIDENCE The driver of this specially equipped car may, by pressing the button on the right of the steering wheel, snap a picture that shows the car ahead and the fender-mounted speedometer at the same time. Although used at present by an insurance company to observe the driving of trucks and salesmen's cars of insured firms, cars so equipped might be of value on automobile proving grounds.

Driver Training Opens New Markets

Organized Instruction for Adults by Automobile Associations Meeting Enthusiastic Reception Throughout the Country

New automobile markets in old fields are being opened up throughout the country by driver-training courses for adults. Pioneered 15 years ago, the scheme is sweeping the country, Traffic Engineer Burton Marsh reported last week in Chicago, where he described the work of the American Automobile Association. The work in both adult and high school driver training is being supported by the Automotive Safety Foundation, headed by Paul G. Hoffman, president, Studebaker Corp., and that organization is gratified by the continued reports of improved highway safety directly traceable to these courses.

Women, because of their greater leisure, predominate among the students of the adult courses. An early report of the A.A.A., discussing the work of 12 affiliated automobile clubs from New York to Denver, showed that 75 per cent of the enrollment consisted of women who were eager to learn how to drive, and to do it safely.

In the first place, the training work has been carefully organized, and consists of classroom and road work. Secondly, a high standard of proficiency is required, making it possible for them to pass State driver tests with flying colors. Again, police judges and highway officials invariably support the work and thus bring to the courses a dignity which attracts enrollment.

More recent activity of the Civilian Conservation Corps and Works Progress Administration in several States has brought the total enrollment and graduates of safe driver courses to several hundred thousands of men, women, and high school students.

Realizing that the average person learns to drive in a hit-or-miss manner, or in a commercial school which usually hurries the student through the course as soon as possible, the A.A.A. undertook a study of the possibilities several years ago. Mounting traffic accidents during the past few years stimulated action.

To Rudolph J. Laporte, manager, Tri-County Automobile Club, Holyoke, Mass., goes the credit of pioneering in adult driving work, about 15 years ago. His textbook, "The Operation of an Automobile," is being used widely throughout the country.

At first the A.A.A. program appealed to members of local clubs as an opportunity to give their wives, sons, and daughters a sound course in how to handle the family car with safety. Newspapers stimulated the interest started by the clubs' own announcements of the courses to their memberships.

In many cities the clubs were unprepared to handle the flood of applications at first. Volunteer teachers had to be trained, and now teacher-training is an integral part of the general plan. Many men and women, who have driven for years but have had unpleasant accident experiences, have enrolled and their testimony has encouraged other drivers to join the classes.

Diverse and human are the letters

(Turn to page 694, please)

News of the Industry

ADVERTISING NEWS NOTES

Hays MacFarland & Co., Chicago, has announced the appointment of Herbert C. Illium, as vice-president. Among the national advertising accounts handled by Hays MacFarland & Co. are the Alemite corporation and the Stewart-Warner corporation.

John W. Crawford, formerly with Allis-Chalmers Mfg. Co., has joined Leo Burnett Co., Chicago advertising agency.

Discussing the question of advertising, H. J. Carmichael, vice-president and general manager of General Motors of Canada, Ltd., Oshawa, Ont., stated while in Montreal that the General Motors Corp. were more and more recognizing the importance of Canadian newspapers and that almost their entire advertising appropriation was for newspaper advertising.

Grace-Bement, Hupp Motor agency, is planning a campaign to introduce another new model with Cord lines.

Newspaper lineage of automobile advertisers is considerably below the 1937 volume for the year to date in spite of increased space used during the New York show.

Buchanan & Co. has opened a Hollywood office with Fred M. Jordan, vice-president, in charge. The agency is handling the Texaco Oil Co. radio program.

Phyllis Noble has been appointed advertising manager of the Lincoln Oil Co., Boston, Mass.

"Advertising Facts," released by the bureau of advertising of the American Newspaper Publishers Association, states that 36 per cent of Buffalo, N. Y., automobile dealers selected newspaper advertising as most successful in building prestige; 61 per cent said newspaper ads brought in the most inquiries; 52 per cent said newspaper ads were the most helpful in bringing in sales.

American Rolling Mill Co. has contracted with NBC for a new series of broadcasts over 42 stations beginning Jan. 15.

New passenger car linage in New York and Brooklyn newspapers during the auto show period dropped about 31 per cent under last year's figures, according to Media Records. The 1937 show ran from Oct. 23 to Nov. 3, twelve days, and this year from Nov. 11 to 18.

The linage totals were 238,920 this year as against 348,549 last year. General Motors institutional copy led with 25,035 lines, followed by Buick with 23,939; Chevrolet, 20,416; Chrysler institutional, 20,054, and Pontiac, 17,829. Gains were registered this year by Buick, Dodge, Ford and Hudson. Chrysler institutional copy was up sharply, while Ford placed 12,800 lines of institutional ads as against none of this type of copy last year.

AIRCRAFT ORDER

• A preliminary order for airplanes to be made in Canada, has been placed by the British Government for the manufacture of one hundred machines at a cost of $10,000,000. The orders have not yet been alloted to the various companies. The central body is expected to make its appropriations shortly.

This first order is what may be described as a "warming up order." In other words it will enable the various companies to get the machinery tuned up, and their efficiency perfected before additional orders for other and more costly planes are forthcoming.

UNITED DIVIDEND

• The directors of the United Aircraft Corp. on Tuesday declared a dividend of 75 cents a share on the capital stock, payable Dec. 15 to stock of record Dec. 2. Previously the company paid 50 cents a share semi-annually.

According to D. L. Brown, president, the company will distribute a bonus to its 5000 employes on Dec. 15. Each employe will receive five dollars if he has been with the company less than a year, $10 for more than one year, $15 from five to ten years, and $25 for ten years and over.

Labor

Martin Nominated as UAW Member on CIO Board

Delegates from the United Automobile Workers Union, contrary to expectations of some observers, unanimously supported adoption of the constitution which changed the Committee for Industrial Organization into the Congress of Industrial Organizations and elected John L. Lewis its president, at the first CIO convention concluded in Pittsburgh on Nov. 18.

Homer A. Martin, UAW president, was nominated by the automobile workers' delegation to be the union's representative on the new CIO 41-man board.

(*Turn to page 692, please*)

Estimated Total '38 Registrations

Result of Preliminary Survey Indicates Current Year May Equal 1937 Peak

Total motor vehicle registrations for 1938 will equal the new all-time high point of registrations reached during the year 1937, according to a preliminary survey just completed by AUTOMOTIVE INDUSTRIES.

This survey, a yearly feature, is made possible through the cooperation of the motor vehicle commissioners of the various states and is

Estimated Total Registrations as of Dec. 31, 1938

	Passenger Cars 1938	Trucks and Buses 1938	Total Motor Vehicles 1938	Total Motor Vehicles 1937
Alabama	239,178	51,243	290,421	313,359
Arizona	106,496	23,267	129,763	129,210
Arkansas	164,950	54,292	219,242	229,867
California	2,319,341	166,132	2,485,473	2,484,653
Colorado	307,220	32,814	340,034	337,217
Connecticut	380,274	49,637	429,911	436,564
Delaware	53,000	10,000	63,000	63,599
District of Columbia	150,687	16,000	166,687	184,119
Florida	350,762	71,000	421,762	418,145
Georgia	354,447	77,596	432,043	441,847
Idaho	113,000	27,000	140,000	142,110
Illinois	1,565,000	222,000	1,787,000	1,768,946
Indiana	813,000	139,000	952,000	956,016
Iowa	656,000	86,500	742,500	745,602
Kansas	495,000	97,000	592,000	586,685
Kentucky	351,100	61,100	412,200	404,455
Louisiana	244,274	77,000	321,274	323,498
Maine	156,000	41,500	197,500	200,907
Maryland	336,050	52,232	388,282	387,410
Massachusetts	733,800	103,600	837,400	846,556
Michigan	1,245,441	135,800	1,381,241	1,505,111
Minnesota	708,000	115,255	823,255	822,598
Mississippi	171,000	51,000	222,000	226,286
Missouri	705,000	135,000	840,000	835,895
Montana	129,531	40,730	170,261	173,892
Nebraska	349,500	61,000	410,500	412,726
Nevada	31,500	7,650	39,150	40,655
New Hampshire	100,700	24,000	124,700	125,939
New Jersey	852,186	135,976	988,162	994,497
New Mexico	97,837	27,645	125,482	118,106
New York	2,263,881	328,859	2,592,740	2,561,703
North Carolina	446,807	74,500	521,307	525,350
North Dakota	142,515	32,200	174,715	173,188
Ohio	1,690,000	178,000	1,868,000	1,876,132
Oklahoma	447,000	100,400	547,400	547,263
Oregon	299,423	63,791	363,214	360,348
Pennsylvania	1,750,510	273,359	2,023,869	1,984,821
Rhode Island	148,405	20,386	168,791	167,586
South Carolina	247,000	44,000	291,000	296,224
South Dakota	153,000	28,095	181,095	184,743
Tennessee	339,000	57,500	396,500	400,384
Texas	1,230,000	317,885	1,547,885	1,552,114
Utah	106,619	20,774	127,393	126,692
Vermont	79,000	9,000	88,000	88,958
Virginia	373,000	68,150	441,150	440,713
Washington	449,925	85,050	534,975	535,483
West Virginia	219,550	43,500	263,050	290,837
Wisconsin	707,000	140,625	847,625	854,374
Wyoming	65,000	17,500	82,500	81,837
Total	25,437,809	4,096,543	29,534,352	29,705,220

based on actual returns to date plus a state estimate for the remaining few weeks of the year. The total estimate is based on reports from 40 of the 48 states, thus representing a high return of 83 per cent.

The preliminary estimate places total motor vehicle registrations at 29,534,000 as compared with 29,705,000 as of Dec. 31, 1937, a difference of 171,000 units. Past experience with these surveys has proven that the estimates lean to the conservative and it is fully expected that this difference will be made up by the time complete returns are gathered a few months from now. It is quite possible that last year's record will be exceeded by a slight margin when the final figures are compiled.

At first thought it would seem likely that total motor vehicles registered would show a decided decline over last year, but a study of past performance demonstrates that they are following the usual pattern. During 1938 approximately 2,000,000 less new cars and trucks went into service than during 1937, when 4,102,000 new motor vehicles were registered. Then, too, vehicles of 1929 and 1930 vintage, the large producing years, theoretically should have largely gone out of service this year as they had passed the average age of cars and trucks in use and normally would be classed as junkers.

However, during depression or recession years, the average age of cars jumps materially and junking declines. This follows the pattern of 1931. Peak sales were realized during 1929 and then a drop of about 1,500,000 during 1930 and a further drop of about 800,000 during 1931. But, it wasn't until 1931 that total motor vehicle registrations reflected the decline in sales during the previous two years and showed a loss of about 2.5 per cent from 1930, the first definite decrease in registrations since the inception of the motor vehicle industry.

Of the 29,534,000 motor vehicles registered this year, 25,438,000 are passenger cars and 4,096,000 are commercial vehicles. New York State maintains first place with 2,593,000 vehicles, followed closely by California with 2,485,000, Pennsylvania with 2,024,000 and Ohio, Illinois, Texas and Michigan, all with well over one million motor vehicles. New York's registrations indicate a slight increase over 1937 while California remains about the same. Pennsylvania and Illinois show an increase but Ohio, Texas and Michigan register declines.—M. A.

Automotive Metal Markets

Copper Fabricating Mills, Sheet and Strip Steel Mills Reflect Automotive Production in Activity

Partly under the influence of the change in tariff rates, which will go into effect on Jan. 1 under the reciprocal trade agreement with Great Britain and Canada, and partly as the result of lessened speculative interest on the European exchanges, non-ferrous metal prices eased off impressively this week. Copper had for some time sold in the open market at from $5 to $10 per ton below the nominal quotation of American producers, which up to Tuesday remained at 11¼ cents a pound for electrolytic. What few transactions took place early this week, consisted of odd lot sales by resellers at 10¾ cents. The export price on Monday stood at 10⅝ cents. Efforts on the part of producers to give artificial support to the market proved ineffective. At the same time Connecticut Valley fabricating mills were working at the best rate since October of last year, orders from automotive consumers furnishing the chief prop.

Straits tin was quoted on Monday at around 46⅛ cents, demand being extraordinarily light. M. J. Houwert, a member of the board of the Billiton Company, one of the largest East Indies producers, on his recent return to Holland following a visit of the United States, emphasized that heavy withdrawals by American automobile manufacturers in October presaged a turn for the better in the tin market.

Zinc prices yielded ground shortly after announcement of the tariff schedules of the reciprocal trade agreements with Great Britain and Canada, under which the duty on zinc ore is lowered, equivalent to a reduction of $7 per ton of refined metal. The price on Monday receded from 5.05 cents to 4.75 cents, East St. Louis, a reduction of $6 per ton. It is estimated that upwards of 75,000 tons of zinc are used annually in the manufacture of automobiles.

Automobile manufacturers and parts makers are pressing finishing mills for earliest possible shipments of sheets and strip steel against previously furnished specifications. How much tonnage booked at prices below those now supposedly in effect remains to be shipped, continues to be a favorite topic of discussion in the market. Some producers insist that they are nearing the end of lower-priced orders on their books and that what business remains at the turn of the month, will carry the currently quoted prices. Others say that they will be all December turning out what backlog they have on their books, a good part of which consists of carry-overs from the October period of lower prices. The steel industry's sheet and strip capacity will be increased by 600,000 tons a year when the leading interest begins operating next month an additional continuous plant of the latest design and construction. This week's rate of ingot output is estimated by the American Iron & Steel Institute at 61.9 per cent of capacity, compared with 62.6 per cent last week. Stocks of primary steel apparently have caught up with the current needs of rolling mills.—W. C. H.

Trade Agreement

Car Duties Bound Unchanged in New U. S. Trade Agreements

Binding of duties on automobiles was provided in the British and Canadian trade agreements made public last Thursday. Although duties remained unchanged by the treaty with the United Kingdom, the American car market was enlarged by reduced British preferentials in 20 colonies.

Under the terms of the British agreement, the first ever negotiated with the United States, the existing duty of 33½ per cent on automobiles of 25 hp. and upward was bound. This is felt to be the most important part of the agreement as far as the automotive industries are concerned as it insures the American exporter against any change during the three-year period that the agreement will be in effect, beginning Jan. 1.

Failure to reduce duties hits only Willys-Overland, Hudson and one Plymouth model. Ostensibly, one Ford model is hurt, but in actuality it also escapes, since Ford makes his own cars in England. General Motors also makes its own cars in England.

Detailed effects of the recently consummated trade agreement between the United States and Great Britain and Canada will be reviewed at a meeting of export managers representing the Automobile Manufac-

(*Turn to page 692, please*)

News of the Industry

HOW'S BUSINESS?

● Salary increases amounting to more than ten per cent, affecting 87 foremen, research workers, engineers, salesmen, clerks and executives of Fansteel Metallurgical Corp., North Chicago, Ill., were announced by Robert J. Aitchison, president. The increase was made retroactive to November 1, and restores half of a general reduction necessitated last January.

"Increased activity in the motor car industry," said Mr. Aitchison, "and especially the enthusiastic public reception of the new 1939 cars, has favorably affected our business by substantial figures.

"Hourly rates of factory workers, of whom there are now 193 on the Fansteel payroll, were not reduced in 1938. It was necessary, however, to reduce hours to a maximum of 32 hours per week for several months in order to provide a little work, at least, for as many employes as possible. The normal 40 hour week was restored to several departments of the plant in September, and many sections are now working two and three shifts."

● F. A. Link, president of the Link Aviation Co. plant at Gananoque, Ont., stated that on a recent trip to England and Switzerland, he had obtained enough orders to keep the plant busy for 19 months. The company manufactures "trainers," ground airplanes equipped for training pilots in blind flying. The plant is now preparing an order of 150 trainers for the British War Department and will continue on this order for another seven months before the new orders will be started.

● The New England hurricane, improvement in general business conditions, and the limitations on passes under the Civil Aeronautics Act, combined to make September the best month yet experienced by the scheduled air carriers, according to an analysis of reports from these operators to the Civil Aeronautics Authority which was made public on Monday.

All time high records were set in September for both the number of revenue passengers and express poundage carried. The lines carried 128,054 pay passengers, an increase of more than 8000 over August, 1938, and of nearly 13,000 over September of last year. Express jumped from 605,100 pounds in August to 877,564 in September.

● H. J. Carmichael, vice-president and general manager General Motors of Canada, Ltd., Oshawa, Ont., states "We are figuring on an increase of 25 per cent in car sales in Canada for 1939 as against an increase of 35 per cent anticipated in the United States." He explained, however, that the apparently lower figure in reality represented a larger gain for Canada, for sales last year declined much less in Canada than they did in the United States.

● New passenger car sales in the United States in the first 10 days of November were running 43.17 per cent ahead of sales in the same period of October, R. L. Polk and Co. reported on the basis of registration reports from principal cities of the country.

Leading the advance over October registrations at the 10-day mark this month were the West South Central states (Arkansas, Louisiana, Oklahoma and Texas) with an increased registration of 68.76 per cent.

Other sections showed 10-day November increases over corresponding October reports were as follows: South Atlantic, 57.26 per cent; East South Central, 55.23 per cent; East North Central, 54.77 per cent; Pacific, 45 per cent; Mountain, 36.29; Middle Atlantic, 19.67, and West North Central, 4.06.

Reports on New England states' registrations for the first third of October were not available.

INDIAN CARS?

● An article by an expert of the Tata Steel Co. of India, "at the request of the minister of education and developments of Bihar Province" has been reprinted in the *National Call* daily of Delhi, in which plans are outlined for the establishment of a factory in Bombay for producing cheap trucks and passenger cars.

The plan visualizes a passenger car with 24 to 28 hp. and a 1½ ton truck using the same engine.

The article points out that in March, 1934, British India with a population of 289 millions had only 203,000 motor vehicles. The importing since then has been of only about 24,000 vehicles a year which is much too small to cope with India's needs. The reason for much of the slowness in India's motorization is the cost of the imported cars. A car leaving Detroit is worth 1800 rupees (3 rupees to $1); the same car by the time it reaches the India consumer is priced at 3250 rupees—double what the American consumer pays for the article.

The factory outlined would use 1500 men of whom about 1000 would be skilled mechanics. Capital outlay would be 15 million rupees or $5,000,000. Capacity would be a potential 15,000 vehicles a year but a minimum of 6000 from the opening would be assured.

The author of the article recommends close cooperation with Detroit, establishment of a designing office there, arrangements for American producing of parts that would later be assembled in India.

Road to Peace

N.A.M. Head Urges Removal of Coercive Elements in Industry

Removal of the twin elements of compulsion and coercion from management-employe relations as the road to industrial peace was urged last week by Charles R. Hook, president of the National Association of Manufacturers.

In a plea for industrial peace and understanding before the Associated Industries of New York, Mr. Hook, who is also president of the American Rolling Mill Co., said that neither management nor labor union officials nor government should be permitted to force upon workers a particular system of selecting their representatives or a particular organization to represent them.

"If the element of compulsion and coercion were removed from current industrial relations, great progress would be made in the direction of industrial peace," Mr. Hook said. "Industrial peace is a prime necessity today."

Waves of strikes and the unchecked use of the sitdown weapon, Mr. Hook said, were among the major causes for the precipitous decline of business activity in 1937.

"Legislation is not the answer," he said. "Putting a law on the statute books won't solve our labor problems, though I should add that when we do have a law it should operate fairly and equally."

Does Not Seek Advertising Control

Justice Department Head States Anti-Trust Laws Give No Power in Reply to Criticism of Ford-Chrysler Decrees

Thurman Arnold, head of the Justice Department's anti-trust division, in a letter to R. I. Elliott, associate editor of *Advertising & Selling*, has denied that the consent decree signed with the Department by the Ford Motor Co., and the Chrysler Motor Corp., is indicative of his desire to regulate advertising.

Since the decrees were signed, the Department has been under some criticism for its announcement that the advertising regulations, to which the companies agreed, may become "most important precedents in preventing the misuse of advertising power in other fields." The Assistant Attorney General, however, has since attempted to clarify the Department's stand by pointing out that while voluntary advertising restrictions might be reasonable in consent decrees, there is nothing in the anti-trust laws which permits the Department to regulate advertising.

Referring to his former statement that "monopoly is fostered when advertising is used to put competitors at a disadvantage," Mr. Arnold said:

"In my judgment, sound advertising is a creative effort, and would not be an appropriate subject for coercive regulation. . . . Any determination that a particular kind or use of advertising is uneconomic can best be made by the business men and advertisers concerned, and unsound results can best be remedied through voluntary concerted action on the part of advertisers. Thus, when by voluntary agreement with competitors, any concern seeks to set up advertising practices designed to promote maximum consumption and, at the same time, to give

smaller competitors fair access to the markets, such an effort will be encouraged by the anti-trust division, within the framework of its consent decree policy, as reasonable and beneficial. This is what we had in mind in our (former) release."

In the release referred to Mr. Arnold had suggested that advertising's "proper field" is in the promotion of sales and away fro mthe alleged practice of fostering monopoly. He pointed out that the decrees signed in the automobile financing case may become "important precedents in other fields and advanced the idea as an essential safeguard against the use of advertising either to produce a wasteful system of distribution, or to suppress competition."

There also had been some criticism that if carried further, such a plan might curb the efforts of a large manufacturer, for example, who was introducing a new product in an extensive advertising campaign.

BUSINESS IN BRIEF

Written by the Guaranty Trust Co., New York

With impressive impetus, the expansion of business activity continues. The *Journal of Commerce* index for the week ended Nov. 12 stands at 91.2, as against 89.8 in the preceding week and 87.5 a year earlier, exceeding for the first time this year the corresponding 1937 level.

All branches of merchandising reported increased volumes of transactions last week. "Good results at retail spread confidence in wholesale markets," according to Dun & Bradstreet. Department store sales in the preceding week ended Nov. 12, according to Federal Reserve Board reports, were only 1 per cent below the comparable 1937 level.

The output of electricity by the light and power industry in the week ended Nov. 12 maintained its excess over the corresponding 1937 level attained in the preceding week, the excess being 1.5 per cent, as compared with 0.2 per cent the week before.

Railway freight loadings in the week ended Nov. 12 continued in seasonal decline, with 636,710 cars reported, or 36,623 fewer than in the preceding week and 49,216 cars under the corresponding figure last year. The latest reported decline in loadings was shared by all classes of commodities except coke.

The estimated average daily production of crude oil in the same week was 3,243,250 barrels, the decline of 385,300 barrels for the week almost equaling the gain reported in the preceding week and bringing the output below the current estimated demand for 3,391,300 barrels, as computed by the U. S. Department of the Interior.

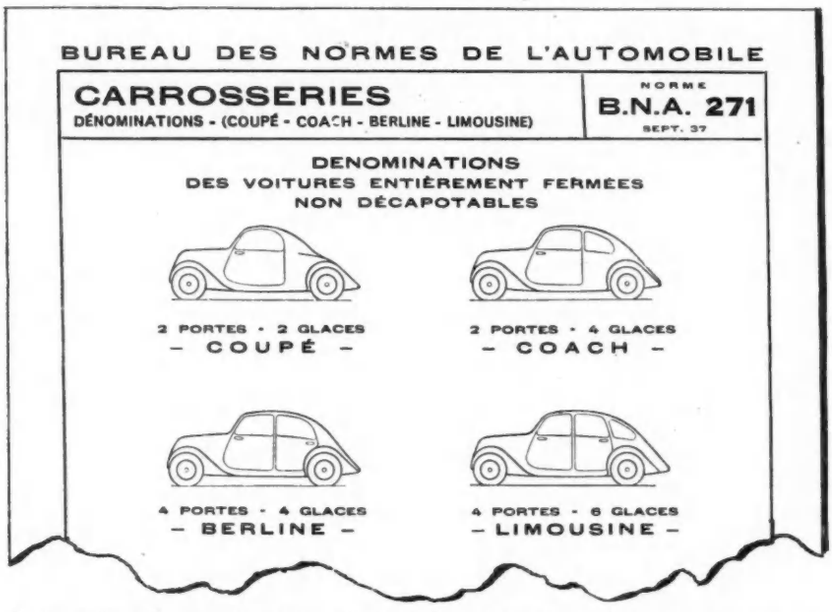
The domestic air transport industry reported 51,350,752 passenger miles flown in October, a new peak figure, nearly 4 per cent above the figures for the preceding month and 21 per cent above the comparable 1937 mileage.

Construction contracts awarded in the 37 eastern States in October, reported by F. W. Dodge Corporation, totaled $357,698,000. As compared with data for October, 1937, residential building contracts were up 72 per cent, non-residential 74 per cent, and public works and utilities 86 per cent.

Professor Fisher's index of wholesale commodity prices for the week ended Nov. 19 at 80.4, as compared with 80.5 the week before and 80.3 five weeks earlier, attests the continued stability of the general price structure.

Member bank reserve balances increased $180,457,000 in the week ended Nov. 16; total bills discounted were reduced by $1,253,000, and industrial advances increased slightly. Estimated excess reserves of the member banks increased $130,000,000 to $3,260,000,000.

Standardized Body Terms



International acceptance of the four standardized body terms sponsored by the French Bureau of Standards (B.N.A.) is expected as the result of discussion at the recent standardization congress held at Amsterdam.

The majority of foreign delegates were in favor of these body designations, and they have been definitely adopted as standard by a number of the leading European manufacturers. The four terms are coupé, coach, berline and limousine. A coupé is an automobile with two doors and two windows; a coach has two doors and four windows; a berline has four doors and four windows, and a limousine has four doors and six windows.

These designations cover 90 per cent of present production, and form the basis of other types developed from these four. The B.N.A. numbers of these standards are 270 and 271. The corresponding American numbers are S.A.E. 1927, p. 727; Germany Project DIN.Kr. 5005; England, I.A.E. 130.

It is suggested that use be made of these expressions by American exporters to Europe, in preference to the generally adopted American terms.

News of the Industry

WHAT ARE THEY DOING?

WALTER JEHU has been appointed district manager of the Timken Roller Bearing Co.'s Boston, Mass. office. Mr. Jehu was formerly general manager of the Timken Roller Bearing Co., Ltd., Toronto, Ont.

ARCH WARNER, until recently Michigan district manager of the Logan Gear Co., is now affiliated with Mechanics Universal Joint division of Borg-Warner Corp. Prior to going with the Logan Gear Co. Mr. Warner was affiliated with the Universal Products Co. for a period of approximately 10 years.

GEORGE H. SPENCER has joined the Bantam Bearings Corp. of South Bend, Ind., a subsidiary of the Torrington Co., Torrington, Conn., to take charge of the New England district.

DONALD A. ROBISON, formerly treasurer of the Caterpillar Tractor Co., has been named general sales manager. **W. J. McBRIAN,** domestic credit manager, has been promoted to head the treasury department.

The appointment of five new men to the Studebaker sales organization has been announced by **GEO. D. KELLER,** vice-president in charge of sales.

F. J. KESTER has joined the sales training division and is located in the general office. He was formerly connected with the Chevrolet Motor Co.

W. H. STEVENS, formerly with the Oldsmobile division of General Motors as District Manager, was appointed district sales manager. He will join the Chicago branch.

J. E. SAGE is appointed district sales manager and will work out of the Kansas City branch. He has had experience with the Chrysler Sales Corp. in various capacities for seven years.

R. C. LIGHTHALL, retail salesman for the Studebaker branch in Buffalo, New York, was promoted to district sales manager of the Pittsburgh branch.

J. M. COLLINS was appointed district sales manager operating out of the Atlanta branch. He was formerly associated with the Chevrolet Motor Co. as district manager for six years.

J. P. LAUFFER who was transferred from Louisville, Ky., to Charlotte, N. C., two years ago as sales manager of the automotive division International Harvester Co., has returned to accept the position of assistant to **R. A. BURDETTE,** Louisville branch manager for the company. Mr. Lauffer has been associated with the organization for the past eight years.

WALTER A. PARRISH has resigned from The Buda Co., Harvey, Illinois, as chief engineer in charge of design and development of gasoline and diesel engines for automotive, industrial and marine application. Resignation is effective December 1. "A needed vacation will be taken and new connection announced for Jan. 1, 1939," he stated.

J. C. NATUS, assistant purchasing agent at Graham-Paige for 13 years, and purchasing agent with Hupmobile for one year, recently joined the Clarke Engineering Co. as purchasing agent.

The United States Steel Corp. has announced the appointment of **G. W. WOLF** as president of the United States Steel Products Co., effective Jan. 1, 1939. This company is the export medium for United States Steel Corp. Mr. Wolf succeeds **G. C. SCOTT,** who is retiring from active service but will remain with the Products Co. in an advisory capacity.

Regional managers for the Covic Diesel division of the Northill Co., Inc., Los Angeles, Calif., were named recently in several territories. R. K. JOHNSON and DAVID BENNETT will make headquarters at 90 Pine St., New York City, and jointly handle the Atlantic Coast north of Norfolk, Va. J. E. OLIPHANT will work from Marion, Ohio, to serve Ohio, Kentucky, Tennessee, and West Virginia. LOUIS SWENSON will have headquarters in Chicago for the territory from that city to St. Louis.

Bliss & Laughlin, Inc., announces that **J. STANLEY McCORD,** formerly of the Cleveland office, has been appointed district manager of the Philadelphia territory. Mr. McCord will be in charge of cold finished steel sales.

G. A. JACOBS has been elected vice-president of the Firth-Sterling Steel Co. He will continue as resident manager in Detroit.

40 Years Ago

● The Agricultural Department of the United States Government, through its office of Road Inquiry, has given considerable attention of late to the subject of steel track highways, or plate ways, as they are called in England. The subject was recently freely discussed before the Liverpool Joint Traffic Association, when some of the ablest engineers in England, among them W. Worby Beaumont, were requested to give their opinions. Mr. Beaumont's judgment was adverse. Not that he denied the overwhelming superiority of the steel track to the dirt or paved road; he took the ground that where the circumstances made a steel plateway desirable, a railway would be still better suited to the conditions, and would be more economical than the former. From *The Horseless Age*, November, 1898.

GM STUDY

● First of a series of three articles on the institution known as General Motors appears in the December issue of *Fortune*, out Nov. 25. Back of the article is a stupendous editorial undertaking, so great that in the view of *Fortune's* editors "it has taken 9 years to assemble an editorial staff capable of tackling so huge an assignment. Since last January, when the study [of General Motors as such] began, almost every one of *Fortune's* 67 editors, writers, researchers and technicians has at one time or another been at work on it, and before the series is finished it is estimated that 5000 man hours will have gone into research alone."

GOVERNMENT AND THE AIR

● The Department of Agriculture, which has used autogiros for several years to detect the Dutch Elm disease on trees and for other purposes, is advertising for autogiro pilots. The Civil Service Commission has announced an examination for pilots as a result. The job pays $3200 annually and calls for work out of Bloomfield, N. J. station of the Bureau of Entomology and Plant Quarantine.

● Edward J. Noble, Civil Aeronautics Authority chairman, has set 250,000 airplanes in use daily as the goal in order to maintain this country's position in aeronautical developments.

● The Department has asked for bids on the construction of its new 325 ft. dirigible which will be used as a training ship and will be approximately 1,000,000 cu. ft. It will require about two years to build.

Labor

(*Continued from page 688*)

Of particular interest to the automotive industry was the resolution adopted by the convention pledging the support of the entire CIO, claiming more than three and one-half million members, to efforts of the UAW to organize the Ford Motor Co. and to obtain a contract with the company. Included in the resolution was a threatened boycott of Ford products by the CIO membership by placing them on the union's "unfair" list, if organizational attempts are resisted.

Trade Agreement

(*Continued from page 689*)

turers Association, to be held on Dec. 2 at the Washington headquarters of the association.

Among other subjects to be discussed at the meeting will be the problems involved in improving the financing of purchase of American motor vehicles in countries where there are trade restrictions.

It was stated in the summary of the British agreement that in recent months the British industry has been disturbed by substantial imports of low price cars from sources other than the United States and that consequently there is increasing pressure in the United Kingdom for the imposition of an even higher duty. The statement said that the United States trade is, however, now safeguarded against an increase of existing rate on vehicles of 25 hp. or more.

The new Canadian trade agreement binds against the 17½ per cent rate of duty on trucks and on passenger cars valued at not more than $1,200. Under the 1936 trade agreement with Canada, now replaced by the new one, this duty was reduced from 20 to 17½ per cent. Other automobile rates were unchanged.

Under the new Canadian agreement the rate on American motorcycles was reduced from 17½ per cent from the rate of 20 per cent carried in the expired agreement. The reduction in the rate on motorcycles required the consent of the United Kingdom which, with free entry, had a bound preference of 20 per cent.

Also under the new Canadian agreement the rate on complete aircraft was reduced from 22½ to 20 per cent. On aircraft engines and parts the rate was reduced from 22½ per cent to 17½ per cent and on other parts the rate was reduced to 15 per cent from 22½ per cent.

Ourselves and Government

Labor Department Declares Waiver of Overtime Payment a Violation of Wage and Hour Act

A weekly check list of legislative, executive and judical actions affecting the automotive industries. First appeared in June 25 issue, p. 831. Corrected to Nov. 23.

Legislative Legacies

MONOPOLY STUDY. The Temporary National Economic (anti-monopoly) Committee has announced that use, distribution and pooling of patents in the automobile and bottle glass industries will be the first subject taken up by the committee. (See "Patent Pooling" on page 686.)

The committee has also made public the procedure to be followed in conducting public hearings, differentiating between those covering reports and those to be based on investigations.

LABOR RELATIONS CASES

The Supreme Court on Monday granted a government petition to review circuit court decision in Chicago which set aside a Labor Board order against the Fansteel Metallurgical Corp., Chicago. (See "Sit-Down Study" on page 687.)

The NLRB has certified the International Association of Machinists, Local No. 105 (AFL) as the exclusive bargaining agent for the die sinkers of Willys-Overland Motors, Inc., Toledo, O. Board action was based on a stipulation by all parties that practically all the die sinkers belong to the IAM. Election by Dec. 3 ordered among maintenance mechanics to determine whether they desire to be represented by Mechanics Educational Society of America, Local No. 4, by International Union, United Automobile Workers of America, Local No. 12 (CIO), or by neither. Board also directed an election at same time among administration building clerical employes, exclusive of supervisory officials, to determine whether or not they desire to be represented by UAW.

LABOR DEPARTMENT

WAGES AND HOURS. Administrator Andrews announced on Monday that employers who may be proceeding on the assumption that a waiver of overtime payment stamped on employes paycheck will result in an effective waiver of rights given by the law are in clear violation of the act.

The Public Contracts Board last Saturday released the full text of its recommendations covering minimum wages for steel workers and at the same time announced that the time for filing of protests had been extended to Dec. 10. The report revealed that Board Member O. R. Strackbein, in a dissenting opinion, recommended a minimum wage of 56½ cents for mills in the East, 55 cents for mills in Missouri, Western Kentucky, Southern Indiana, and Southern Illinois, and 60 cents minimum wage for mills in the Far West. A majority of the Board had recommended a minimum of 62½ cents without differentials throughout the East and West. Mr. Strackbein concurred on the recommendations in the other areas.

Counsel for the Ford Motor Co. asked the NLRB on Wednesday to reverse a trial examiner's report that the company's St. Louis plant violated the Wagner Act in which it was recommended that the company reinstate 192 workers and grant sole bargaining rights to the UAWA.

FEDERAL TRADE COMMISSION

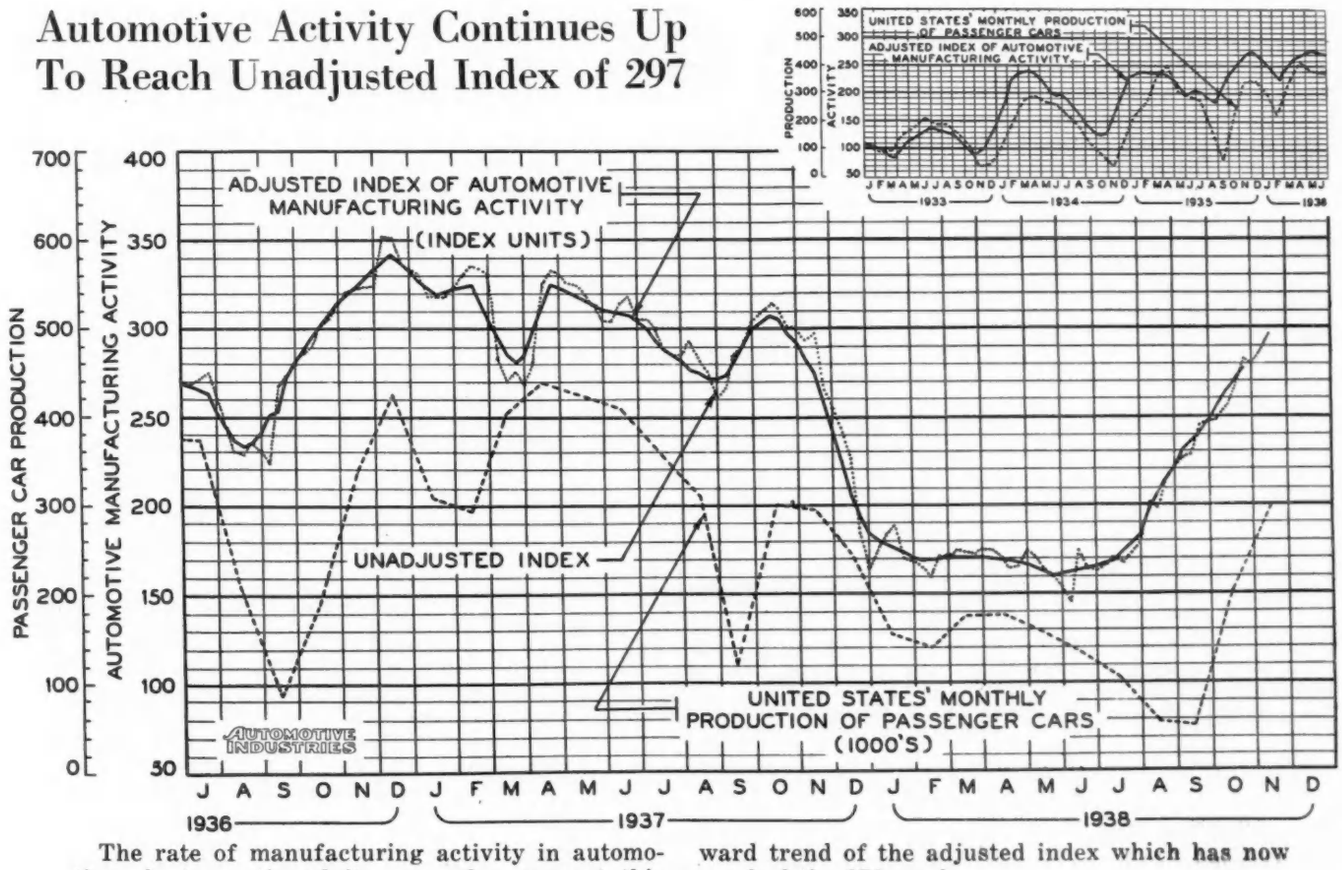
VS. GENERAL MOTORS. Hearings currently under way in New York are running the transcript of the case up to 28,000 pages. The FTC has closed its side of the arguments and will hear testimony from now on from the company. May again hold hearings in at least part of the 17 cities already covered when testimony on the FTC's side of the case was given. The complaint involves the alleged practice of requiring dealers to handle respondent's parts only.

FAIR TRADE PRACTICE rules for retail automobile dealers, introduced at public hearings during last NADA meeting in December (see A.I., April 30, 1938), are still under study by the FTC fair trade practice division headed by George McCorkle.

SIX PER CENT CASE. Ford and General Motors cited by FTC in July, 1937 for false and misleading representations in advertising finance plans. Briefs on both sides in the Ford case have been filed and final arguments may be held sometime during December. In the GM case, the examiner's report has been filed and the FTC brief is due early in December.

F.O.B. PRICES case vs. GM and Ford. Involves FTC allegation that price advertising was misleading because of failure to include standard equipment. Tentative date for hearing on the Ford case scheduled for Nov. 29 in Detroit.

Automotive Activity Continues Up To Reach Unadjusted Index of 297


ADJUSTED INDEX OF AUTOMOTIVE MANUFACTURING ACTIVITY
(INDEX UNITS)
UNADJUSTED INDEX
UNITED STATES' MONTHLY PRODUCTION OF PASSENGER CARS (1000'S)
PASSENGER CAR PRODUCTION
AUTOMOTIVE MANUFACTURING ACTIVITY
AUTOMOTIVE INDUSTRIES
J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1936
1937
1938

The rate of manufacturing activity in automotive plants continued its upward movement this week to reach the unadjusted index figure of 297 for the week ending Nov. 19. This represents a gain of 10 points over the week ending Nov. 12, which, in turn, was seven points over the preceding week. Increasing activity continued the upward trend of the adjusted index which has now reached the 278 mark.

This same month last year automotive manufacturing activity, as noted on the chart, was well on its way down. The failure of an expected post-Automobile Show sales slump to appear this year may portend further upward revision of the index.

News of the Industry

TIRE WEIGHT

• The weight of the average automobile tire has increased from 15.4 pounds in 1922 to approximately 27.8 pounds this year, according to Commerce Department calculations. Rubber and cotton comprise about 65 per cent of the content of the average tire, the per cent of cotton having declined and the per cent of crude rubber having increased with development of the balloon casing. In today's tire with an average weight of 27.8 pounds are 13.73 pounds of rubber and 4.37 pounds of cotton.

Average inner tube weights have increased from 2.24 pounds in 1922 to 3.01 pounds—of which 2.20 pounds represents the rubber content.

PUBLICATIONS AVAILABLE

The Automobile Manufacturers Association is one of the organizations whose services are cited as examples of successful trade association work in **"Today's Challenge to Trade Associations,"** published by the Western Division of the U. S. Chamber of Commerce. The book presents a series of lectures delivered before the Western Conference for Commercial and Trade Executives by R. C. Edlund. Copies are available from the Trade Association Department of the Chamber in Washington at a price of $3.00.

Mine Safety Appliances Co. has published two bulletins concerning instruments for **dust sampling.** Bulletin No. CT-1 features the M.S.A. Midget Impinger. Bulletin No. CT-2 features the M.S.A. Electrostatic Dust and Fume Sampler.*

A new leaflet describing **Flexarc welding cable** has been published by Westinghouse Electric and Manufacturing Co.*

Patent No. 2,133,495, has been recently issued to Willey's Carbide Tool Co., which relates to the method of **forming hard compact metals suitable for tools** such as cutting, drilling, surfacing tools, drawing dies, molds and other implements. A copy of this patent will be sent to anyone who is interested in same together with additional patent copies under which Willey's Carbide Tool Co. operates.*

Chain Belt Co.'s new **screw conveyor** line is described in a catalog recently issued. This publication contains information on screw conveyor installations, selection of screw conveyors, capacity charts, and specifications.*

Two new research bulletins have been published by the Purdue University engineering experiment station at Lafayette, Ind. They are: **"Making Barium Chloride from Barium Sulfate,"** by R. Norris Shreve, W. N. Pritchard, Jr., and C. H. Watkins; and **"Methods and Equipment for Testing Safety Glass,"** by Ray B. Crepps and C. S. Sprague.*

An extensively revised folder, **"Hard-Facing with Haynes Stellite Rod (Oxy-Acetylene Process),"** has just been completed by Haynes Stellite Co., a unit of Union Carbide and Carbon Corp. A similar revised folder presents comparable data for hard-facing by the metallic arc process.*

"The Preservation of Business Records," a pamphlet recently issued by the Business Historical Society, Baker Library, Soldiers Field, Boston, Mass., offers answers to the questions: Why should business records be preserved? What material should be selected for preservation? How should records be preserved? and, When should preservations be undertaken?*

Joseph T. Ryerson & Son, Inc., has released a bulletin on Taylor Alloy **steel sling chains.** In addition to a "safe working loads" table and specifications chart, data are given on all chains carried in stock.*

Republic Steel Corp. offers a 12-page folder entitled **"Why Should I Use Republic Galvannealed Sheets?"** In answer to this direct question, details are included on Advantages of Galvannealed Sheets, Corrosion Resistance, Forming, Uniformity, Coating, Uses, Grades and Finishes, Chart on Gages and Sizes and Table of Extras for Widths and Lengths.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

N.I.C. MEETING

• Officers of organizations representing approximately 50,000 manufacturing, processing and other business enterprises in the United States will gather Dec. 5 and 6 at the Waldorf-Astoria in New York for the annual meeting of the National Industrial Council.

The N.I.C. is a federation of national, state and local industrial associations sponsored by the National Association of Manufacturers. Charles R. Hook, president of the American Rolling Mill Co. and president of the National Association of Manufacturers, is chairman of the N.I.C.

The council meeting will precede the three day meeting, Dec. 7, 8 and 9 of the National Association of Manufacturers' Congress of American Industry at the Waldorf-Astoria.

Prominent among the topics to be discussed will be industry-labor relations; social security problems; wage and hour act problems and relations between industry and the public.

CONVENTIONS AND MEETINGS

National Standard Parts Association Meeting, Chicago	Dec. 2-3
National Industrial Council Meeting, New York	Dec. 5-6
Congress of American Industry, New York	Dec. 7-9
SAE Annual Meeting, Detroit	Jan. 9-13

SHOWS AT HOME AND ABROAD

Long Island Automobile Show, World's Fair, N. Y.	Nov. 23-Dec. 4
Newark, N. J., Automobile Show,	Nov. 26-Dec. 3
Kansas City Automobile Show,	Nov. 26-Dec. 3
National Motor Show of Canada, Toronto, Ont.	Nov. 26-Dec. 3
New Orleans, La., Automobile Show,	Dec. 3-5
Denver, Colo., Automobile Show,	Dec. 5-10
Automotive Service Industries Show, Chicago	Dec. 5-10
Grand Rapids, Mich., Automobile Show	Jan. 2-7
National Motor Boat Show, New York,	Jan. 6-14
Seattle, Wash., Automobile Show,	Jan. 9-15
Berlin, Germany, Automobile Show,	Feb. 17-March 5

Driver Training

(Continued from page 687)

of commendation praising the courses. Two spinster sisters were left a car by their brother, and both enrolled. Upon examination, the older one, about 65, was advised not to try driving an automobile. The younger took the course, and recently they took a trip through the Canadian Rockies, and have just bought a new car to continue their new adventure of seeing America.

A number of husbands found it impossible to teach their wives to drive, but under instruction of the A.A.A. courses these women have obtained their driving licenses—and several of the men report that their wives drive better than they can.

Scores of women have been given "their own" cars by their husbands upon completing the work of the adult courses.

Hundreds of fathers have bought cars for their families' use since a son or daughter has learned to drive in the A.A.A. courses.

A missionary nurse on furlough from China was so impressed with her lessons that she started a school for automobile drivers in a far-off province since returning to her post.

A newspaper woman drives a reporter's car, now, and a number of firms have sent young men to the classes—"to make them more valuable to the company."

A man who does a lot of driving with his wife and daughter has two able drivers to relieve him of the tedium of his long trips, since he sent them to an A.A.A. school.

In the most successfully operated courses, each applicant is given a series of tests to disclose physical or other handicaps. Visual acuity, judgment of distance, color blindness, reaction time, and muscular coordination, are among the points covered. Some of the weakness found can be corrected. Most people never realize such defects in themselves.

If the club is tactful in rejecting applicants, most of the men and women prove to be grateful, realizing that their driving would be hazardous both to themselves and others.

Then the club undertakes a thorough course, including home reading, classroom lessons, and road lessons. Fair play on the road is stressed. Fundamentals of car and engine operation are taught. Starting, stopping, shifting—on the level and then on hills—is taught by the instructor. Parking, backing, driving through intersections, driving

over a hill, and around difficult turns are explained in the class room, demonstrated, and then carefully taught over selected courses. Finally, driving under actual conditions of heavy traffic, and an examination covering the points of state driver license tests, completes the course.

Dual control cars are widely used in this work. In Cleveland alone 19 cars are equipped with dual controls for this work undertaken by the city's automobile club.

Finance Companies Advised

Finance companies would do well to keep social responsibilities uppermost in mind and govern themselves accordingly in order to head off unfair legislation, John J. Schumann, president of the General Motors Acceptance Corp., told members of the National Association of Sales Finance Companies at their fifteenth annual convention in the Stevens Hotel, Chicago, on the opening day of their two-day conclave Nov. 14 and 15.

The recent consent decree in the Ford and Chrysler cases came in for attention also when P. W. Haverman, general counsel of Commercial Investment Trust, stressed the point that the government's action did not constitute evidence that the companies involved had committed any illegal acts.

One of the highlights of the meeting was an address by Arthur W. Newton, vice-president of the First National Bank of Chicago, wherein he presented the banker's viewpoint. Mr. Newton stated that the finance companies may expect more spirited competition from banks in the future, but that they have nothing to fear. He expressed the opinion that the new form of competition would result in curtailing finance company profits, and advocated fair treatment of customers even to the extent of rebating them when note payments are completed in advance of the date of maturity.

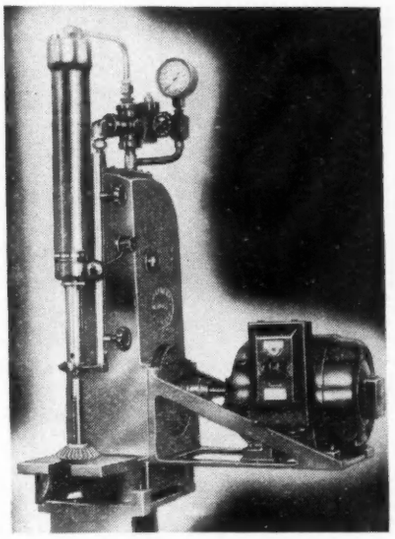
Arthur D. Weller, Rochester, N. Y., was reelected president of the association. The following vice-presidents were voted in: T. E. Courtney, De Kalb, Ill.; A. O. Dietz, New York City; Clarence L. Landon, Omaha, Neb., and L. M. Seiver, Philadelphia. G. H. McClure and Milan V. Ayres, both of Chicago, were chosen as treasurer and secretary, respectively. Marshall K. Hunter, Savannah, Ga., and E. B. Meredith, Middletown, Conn., were added to the board of directors.

TOOLS OF TOMORROW

Bench Type Press

. . . Greenerd develops new completely self-contained hydraulic machine

One of the latest products of the Greenerd Arbor Press Co., Nashua, N. H., is a 1½-ton bench-type hydraulic arbor press for production pressing, broaching, assembling, and burnishing. A photograph of the machine appears on this page.



Greenerd 1½-ton bench-type hydraulic arbor press.

The press is equipped with a 2-in. piston and 3 piston rings. The ram is 1½ in. in diameter. Pressure may be set from 50 lb. to 1½ tons.

The ram is put into motion by a hand lever. Pressure will remain on the work until this lever is released, automatically returning the ram up to a power stop which may be set at any predetermined point within the stroke of the ram. The machined working table measures 8 by 8 in. and has a 2-in. slot.

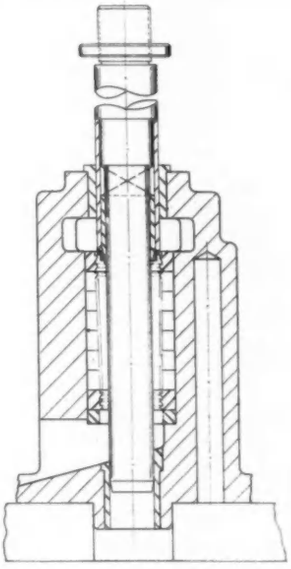
Synchronizer Rings

. . . Broaching feature of new production set-up in one automotive plant

To improve synchronizer action in 1939 automobile transmissions and eliminate clashing during shifting in connection with the adoption of shift controls mounted on the steering column, one manufacturer has developed a new production set-up for more accurate manufacturing of synchronizer rings. A feature of the set-up is the broaching operation for cutting the external synchronizer teeth.

A standard vertical broaching machine is used with a special fixture developed by the Colonial Broach Co. The fixture, shown in the accompanying drawing, is of the push type. It broaches 30 external teeth on the synchronizer ring simultaneously, alignment being held to close tolerances with the bore of the ring.

The part is pushed downward through the fixture, the broaches being stationary, and drops out at the bottom of the stroke.



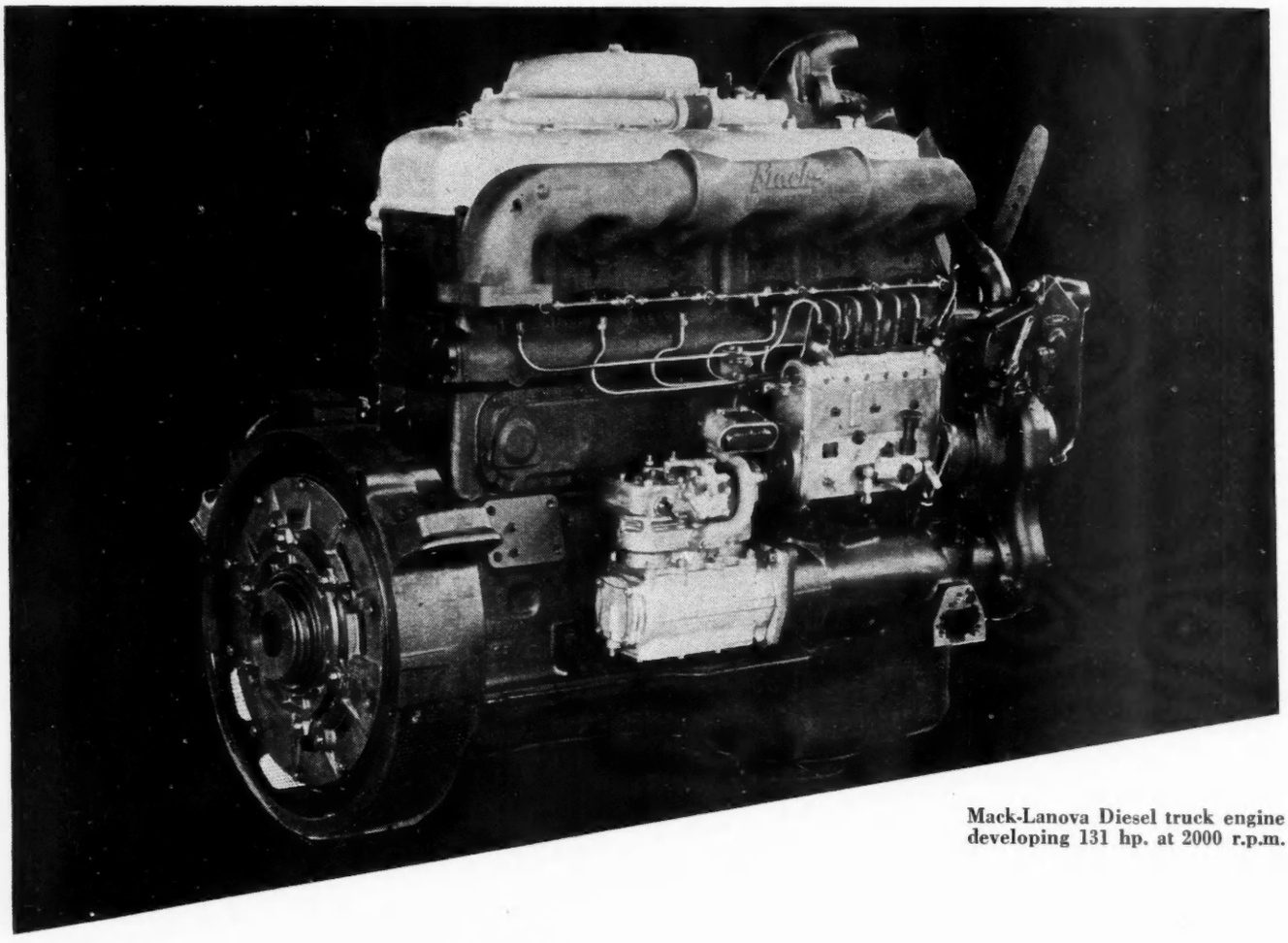
Colonial Broach fixture for broaching teeth on synchronizer ring.

Sizing Control

. . . Development converts Monarch engine and tool room lathes into automatic machines

The Monarch Machine Tool Co., Sidney, Ohio, has announced a lathe development which it calls "Automatic Sizing." It is essentially a new type of control for Monarch engine lathes and tool room lathes, converting them into automatic machines for the purpose of producing parts

(Turn to page 710, please)



Mack-Lanova Diesel truck engine developing 131 hp. at 2000 r.p.m.

MACK MANUFACTURING CORPORATION has joined the growing list of commercial-vehicle manufacturers offering models equipped with Diesel engines. Mack is producing its own engines, making use of the Lanova combustion head. The step was not a precipitate one, for Mack has been equipping some of its trucks with various American and European Diesel engines and has been experimenting with Diesels for the past eight years.

At present the engine is made in one size only, a six-cylinder of 4⅜-in. bore by 5¾-in. stroke, which has a displacement of 519 cu. in. and develops 131 hp. at 2000 r.p.m. The maximum torque is 381 lb-ft. and the maximum b.m.e.p. 110 lb. per sq. in. Bosch injection equipment is used, and the starter operates at 12 volts.

As already mentioned, the engine employs the Lanova "energy-cell" combustion system, for which it is claimed that it gives the maximum output per cu. in. in combination with low peak pressures, fuel pressures, compression pressure and bearing loads. The injection nozzles used are of the self-cleaning pintle type.

Engine cylinders and crankcase are cast in a single block which forms a compact unit of great vertical stiffness. It is braced by seven bulkheads which support the main and camshaft bearings and extend well below the crankshaft level. No less than 69 separate cores are used in producing this casting. The material from which the block is poured is a high nickel-chromium semi-steel of special analysis, and the castings are produced in the Mack foundry. To relieve shrinkage and machining stresses, the blocks are annealed in electrically-heated continuous furnaces. Cylinder heads are cast in two interchangeable blocks of three and are held to the block by forty large studs. Making the cylinder heads in two castings is said to facilitate service operations. The cylinders have dry liners of high nickel-chromium semi-steel, which are honed to a high finish. Solid copper gaskets are inserted between the cylinder heads and the block.

The overhead valves are arranged in the longitudinal center line of the engine and operated by drop-forged rocker arms and tubular ball-ended pushrods from mushroom tappets. Valves have 30-deg. seats, and the exhaust valves seat on inserts of Niferrite which are copper-plated and faced with Stellite.

The rocker-arm covers are aluminum castings. To make it possible to prevent leakage of oil without unduly high pressure on the gaskets, the top of the cylinder head is recessed and the oil never rises to the level of the gasket. A ventilation scheme prevents the accumulation of pressure in the rocker-arm chambers.

Peak pressures of combustion are said to be only little higher than in gasoline engines, and efficient combustion is said to be maintained through a wide range of speeds and loads, as turbulence is induced by thermal expansion and is, therefore, virtually independent of engine speed. Full-length water jackets, in addition to reducing the temperature of the crankcase oil, contribute further to the rigidity of the block.

The crankshaft is of the seven-bearing type and is provided with

Mack Making a Diesel

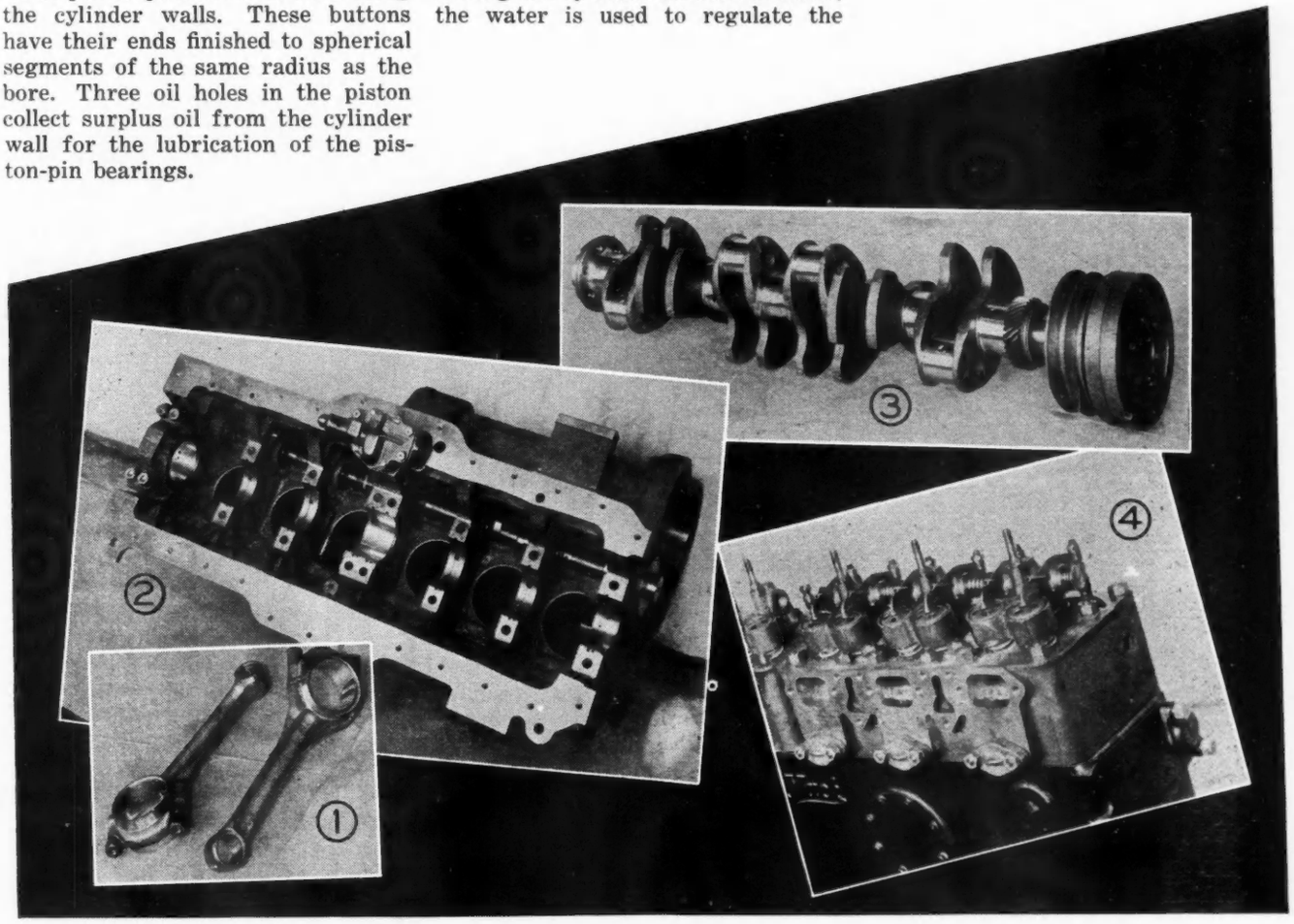
twelve integral counterweights. Having main journals of 3½-in. and crankpins of 3-in. diameter, it is unusually stiff. Excellent wear resistance is obtained by pack-carburizing and case-hardening the bearing surfaces.

Pistons are of the cam-ground aluminum-alloy type, provided with a T-slot in the skirt to permit of fitting to a close clearance. There are no internal ribs in the piston, and the sections of the head and ring belt are proportioned to assure rapid heat flow. The wrist pin is of the full-floating type and is lapped to a tolerance of 0.0002-in. It turns in a thin bushing in the rod and bears directly on the aluminum in the piston bosses. Both bearings are diamond-bored to the same tolerances. Telescoping aluminum buttons are inserted into the ends of the hollow wrist pin to prevent it from scoring the cylinder walls. These buttons have their ends finished to spherical segments of the same radius as the bore. Three oil holes in the piston collect surplus oil from the cylinder wall for the lubrication of the piston-pin bearings.

Like the crankshaft, the camshaft is a steel drop forging, pack-carburized and case-hardened, and it runs in seven bearings. Camshaft and accessories drive is by gears exclusively. There are only four gears, and these are cut from drop-forged blanks having the grain run radially. The helical teeth are finished by grinding in generating machines. There is one gear on the crankshaft, one on the camshaft, one on the accessories-drive shaft, and the fourth on the fuel-pump shaft, the last two gears meshing separately with the camshaft gear. Thus the fuel pump is driven from the crankshaft through only two sets of accurately-ground teeth.

Thermostatic control is provided for the cooling system, the control units including a thermostatic valve and a cold-water by-pass. Besides cooling the cylinder blocks and heads, the water is used to regulate the temperature of the crankcase oil. An oil filter is built onto the engine. Its filter element is of the cut-back type, and the purified oil is returned to the crankcase below the level of the crankshaft sweep, so it cannot be immediately swished around by the rotating parts. The crankcase is ventilated through the tappet chamber and pushrod passages to the rocker-arm chamber on top of the engine, from where a two-part aluminum header connects with an air filter.

1—Connecting rods split at 35 deg.
2—Engine block seen from underneath.
3—The counter-balanced crankshaft with its vibration damper and fan pulley.
4—One of the two cylinder heads assembled with its valves and rocker arms



Cost of Gasoline and Fuel Tax in Europe Promotes

New Developments

By P. M. HELDT

A GREAT deal of development work on small Diesel engines has been done in recent years by the Swiss firm of Saurer at Arbon. It started out some ten years ago by building high-speed Diesels with the Acro combustion head. In the Acro system there is a separate combustion chamber in the cylinder head which communicates with the cylinder through a throat or venturi, and the fuel is injected into the throat from the cylinder side. Saurer later modified the system so that the fuel was injected across the air stream in the cell or chamber after it had passed through the throat. Still later the firm developed its own form of combustion chamber, known as the dual turbulence chamber, which is located in the upper part of the piston. Air flow in the horizontal plane is produced by masked inlet valves, and in the vertical plane, by the heart-like shape of the chamber in the piston head.

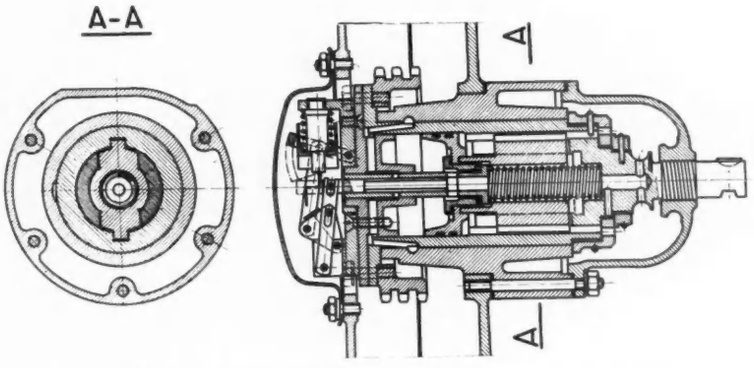


Fig. 12—Section of Saurer automatic injection-timing device

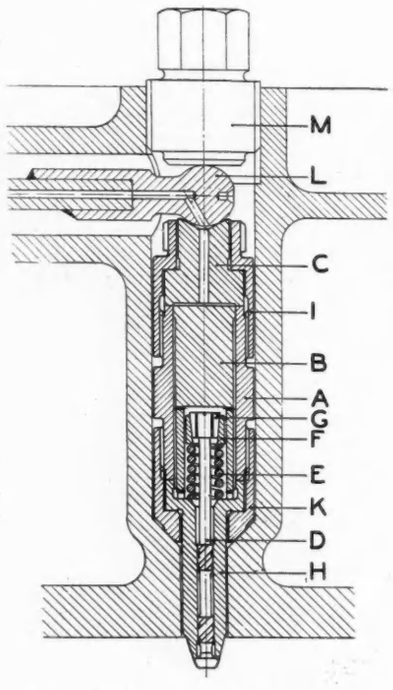


Fig. 11—Saurer injection nozzle which gives an "umbrella-shaped" spray

A, injector body; B, bar filter; C, spacer; D, valve; E, spring; F, cone on valve; G, valve nut; H, guide; I, upper cap nut; K, lower cap nut; L, fuel-tube connector; M, set screw.

Sauer also developed its own type of injection nozzle (Fig. 11), which is of what is referred to as the annular-slot type. The valve which closes the nozzle has a mushroom-type head and gives a conical-sheath spray of 150 deg. included angle. It is claimed for this nozzle that at low speeds the valve lifts only very slightly, hence the pressure behind it builds up quickly, so that the fineness of atomization is just about the same as at high speeds, which is not the case with the multi-orifice nozzle, where the effective area is approximately the same at all speeds.

Back of the valve head there are helical flutes on the valve stem, which ensure a more nearly uniform distribution of the fuel throughout the combustion chamber. A fuel filter is built directly into the injector. A neat method of securing the fuel pipe to the injector is being used. The injector is set into a bore in the cylinder head, in which it is submerged. It is provided with a spherical seat at its outer end, against which rests the spherical terminal of the high-pressure line, which is inserted through a cross bore. The terminal is forced against the top of the injector by a set screw, as shown in the illustration. To prevent stress concentration at the joint of the tube with the connector, the latter is cut off at an angle of about 45 deg.

An automatic timing device for injection pumps has been developed by the Saurer company, of which a sectional view is shown in Fig. 12. It comprises a sleeve with two internal helical grooves of small helix angle, which is driven from the engine crankshaft by means of a chain. Within this sleeve there is a hollow, slidable member with two helical splines fitting the grooves in the sleeve. This member can be slid axially by the governor weights

Part Two *Concluding Part One which appeared in the September 10 issue of* AUTOMOTIVE INDUSTRIES

in High Speed Diesels

rotating with the sleeve. Between the sleeve and the slidable member are located the forked ends of the drive shaft which is coupled to the pump shaft. With a change in speed of the crankshaft and of the sleeve driven by it, the governor weights move outward from the axis of rotation, and through suitable connection move the slidable member lengthwise relative to the sleeve. This motion between sleeve and slidable member is accompanied by an angular motion of the latter, which

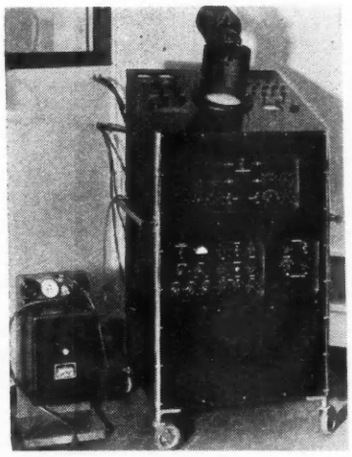


Fig. 13—Engine indicating cabinet specially developed for use with Diesel engines

motion is transmitted to the drive shaft, and thus the pump shaft is advanced relative to the crankshaft, causing injection to start earlier in the cycle. In the small Saurer Diesel engine, type CCD, this automatic injection timing device advances injection beginning from about 5 deg. ahead of dead center at 1500 r.p.m. to 13½ deg. at 3000 r.p.m. Below 1500 r.p.m. the rate of change in the timing is more rapid, and at about 850 r.p.m. injection begins only at dead center.

A special engine indicator of the electric type, for use with Diesel engines, has been developed by the Saurer research department. All of the electrical accessories, together with the oscillograph, are built into a cabinet mounted on casters, provided with photographic equipment, and supplied with alternating current from the shop mains. The oscillograph is installed in a sound- and vibration-proof room adjacent to the testing laboratory, which enables the test engineer to work under more favorable conditions and is advantageous also from the standpoint of the apparatus.

Piezo-electric pressure elements are inserted in the cylinder walls, and the electric lines from the pressure elements, which are well insulated and shielded, lead to two potentiometer amplifiers and from there through a commutator to the deflection plates of a double cathode-ray oscillograph. This commutator also permits of recording timing marks or any other phenomena on the ordinate axis of the diagram.

A calibrating device which can be switched into the circuit permits of checking the pressure device, the am-

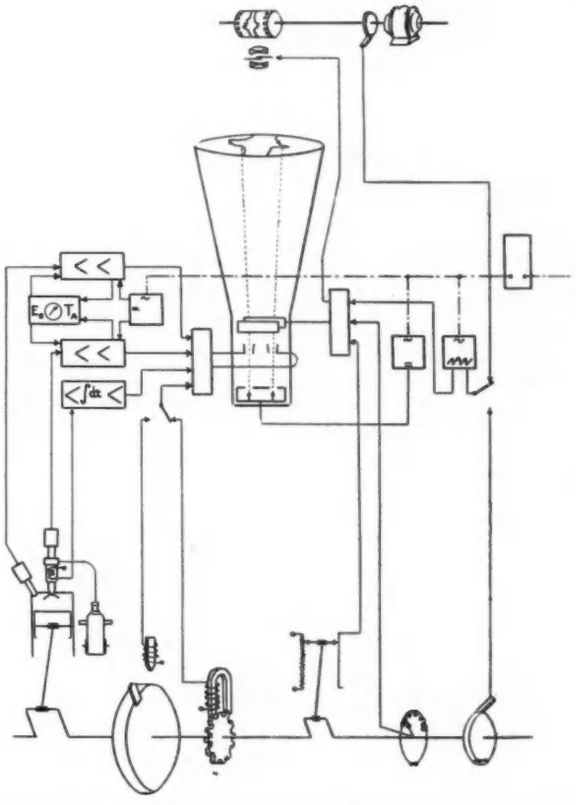


Fig. 14—Schematic circuit diagram of piezo-electric indicator

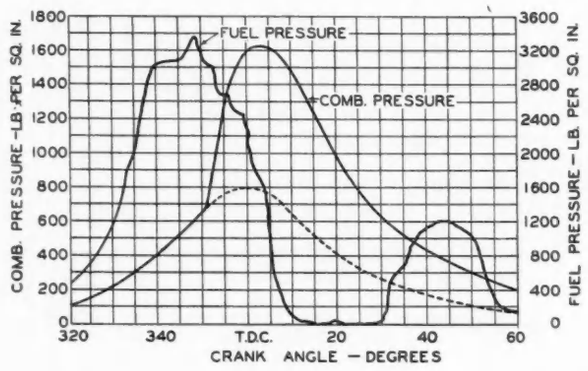


Fig. 15—Super-imposed combustion and injection pressure diagrams

plifier, and the oscillograph.

There are three possible means of producing the horizontal sweep of the cathode-ray beam as follows:

1. Electrical sawtooth-wave generator.
2. Deflection proportional to piston travel.
3. Deflection proportional to the crank angle.

Either a plate or a film-drum camera can be used for taking records.

Fig. 13 shows the complete installation, while Fig. 14 is a schematic circuit diagram of the cathode-ray engine indicator, and Fig. 15 shows engine pressure and injection pressure diagrams taken by means of this apparatus.

The Saurer research department also has built a pressure chamber for the study of injection phenomena, as shown in Fig. 16. The bomb can be filled with compressed air from a pressure vessel to any pressure up to 375 lb. per sq. in. The interior of the bomb is illuminated stroboscopically through a safety-glass window, by means of an arc lamp, and there is a second window through which the phenomena inside the bomb may be observed or through which photographs of the interior may be taken.

To prevent the entire interior becoming filled with fuel fog in long runs, which would make observations impossible, the nozzle ordinarily injects into a receptacle. When an observation is to be made or a photograph to be taken, this receptable is pushed aside, either manually or by means of an electro-magnet, so that the spray jet can develop freely.

To facilitate the taking of photographic records, the shaft of the injection pump, the fuel receptacle, and the control member of the photographic shutter are electrically interconnected, and when a record is to be taken, these are released in the proper order by merely pressing a button. The photographic records are said to reveal that with the annular-slot injector the spray develops with great regularity, and this is ascribed to the fact that the valve lift varies automatically in proportion to the injection quantity. The diagram, Fig. 17, shows the penetration of the fuel jet from an annular-slot injection nozzle into air at 68 deg. Fahr. and 20 atmospheres pressure.

In Europe, the six-cylinder is the preferred type of Diesel engine for truck and bus use, although for smaller powers, as used for passenger cars, taxicabs, and light delivery wagons, the four cylinder predominates. With six-cylinder engines, owing to the relatively high weight of the moving parts, the critical speed due to harmonics of a frequency equal to six times the crankshaft speed is usually within the operating range, and as this causes considerable torsional vibration, torsion dampers are usually provided.

The Saurer company made some tests on its six-cylinder 221-cu. in. engine with a Summers torsiograph. Without a vibration damper there was a serious critical speed at 2300 r.p.m., due to the "sixth harmonic." Critical speeds due to the 7½, 9, 12, and 15 harmonics were also plainly discernable. Without vibration damper the moving system had a natural torsional frequency of 13,740. When a damper of the rubber-hysteresis type was applied, the frequency of the system decreased to 11,550 cycles per min., but the damping action greatly decreased the amplitude of the vibrations, that of the highest critical being reduced 64 per cent.

An interesting recent development in the Diesel-engine field in Germany is that of a standard engine for cross-country-type army trucks. Three leading manufacturers of Diesel engines—M.A.N., Henschel and Humboldt-Deutz—were commissioned to evolve the design. The secretarial work was assigned to M.A.N., whose type of combustion chamber (Fig. 18) was chosen. The engine, I understand, is already in

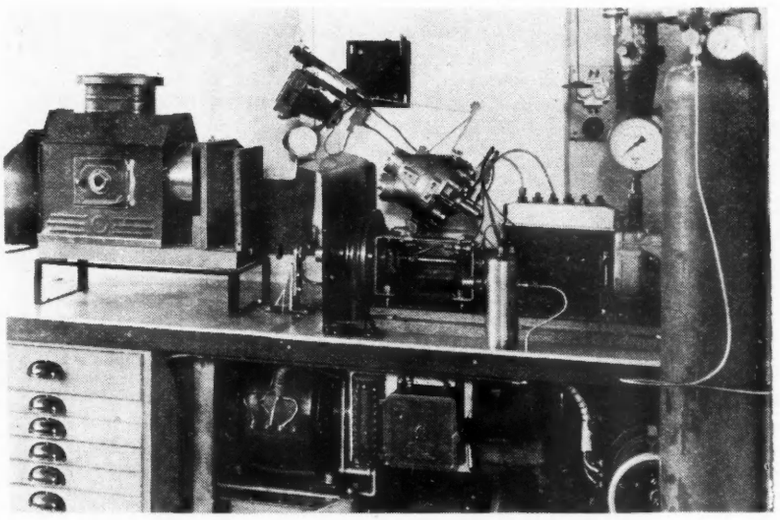


Fig. 16—Saurer apparatus for studying fuel sprays

production by 10 different manufacturers. Whether it is to be sold also for installation in commercial vehicles I have been unable to learn.

The general specifications for the engine, settled upon after tests of the cross-country army truck with other engines, were as follows: Weight, not over 1320 lb.; continuous output (90 per cent of the peak output), 75 hp. net; as high a speed as practicable, because of its effect on the size and weight of the transmission members.

A speed of 2400 r.p.m. was selected and it was decided to make the engine a six-cylinder of 4.13 by 4.72 in. bore and stroke. These cylinder dimensions were about the smallest the three manufacturers who developed the new standard had had any experience with.

Tests extending over a number of years, made at M.A.N., showed that the friction m.e.p. of a Diesel engine can be roughly represented by a straight line on a base of piston speed, corresponding to the equation $P_f = 15.25 + 0.0144\ S$ lb. per sq. in., where S is the piston speed in ft. per min.

At a piston speed of 2000 ft. per min. the friction m.e.p. is 44 lb. per sq. in. As the friction m.e.p. increases with the piston speed and the i.m.e.p. decreases, it is obvious that the brake thermal efficiency decreases rapidly at high speeds, and for this reason a piston speed of 2000 ft. per min. was considered the limit, which with the stroke chosen gave a rotary speed of 2400 r.p.m. Cross sections of the engine are shown in Figs. 19 and 20.

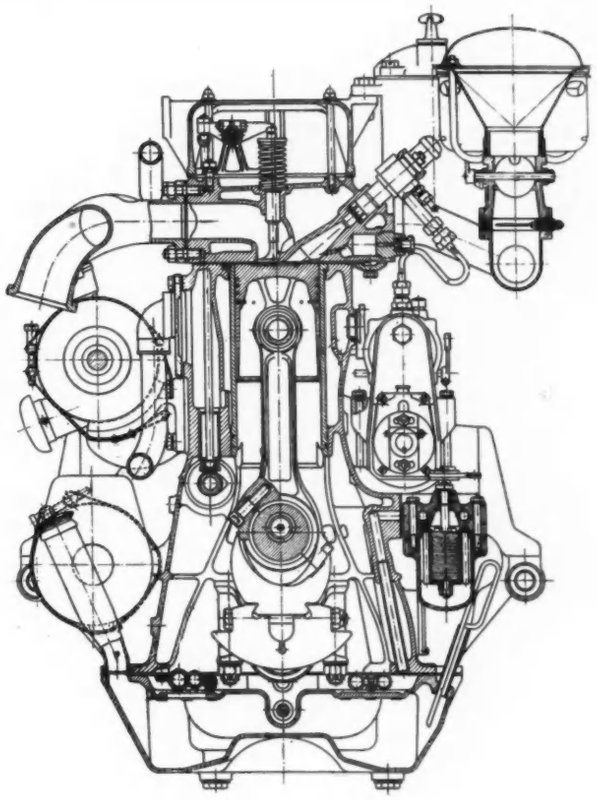


Fig. 19 — Transverse section of standardized German Army - truck engine

Gray iron was used as material for the engine block, but experiments were made also with silicon-aluminum alloy. Wet liners are used. It is planned to regrind the liners after they have worn, and to then use them with new, oversize pistons. Main bearings have lead-bronze linings. Six of the bearings are of the same size, while the center bearing, on which the end thrust is taken, is wider than the others. Making the rear bearing (which is next to the rather heavy flywheel) no wider than the intermediary bearings is quite a departure in automotive practice. The six bearing shells are interchangeable, and are lined on their cylindrical surfaces only. While copper-lead is the bearing alloy regularly used, experiments have been made

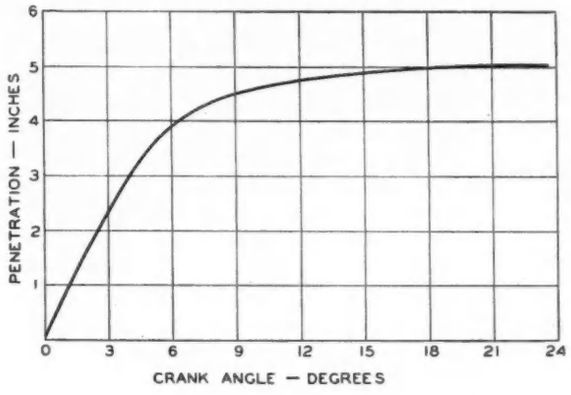


Fig. 17 — Penetration of fuel spray vs. crank angle

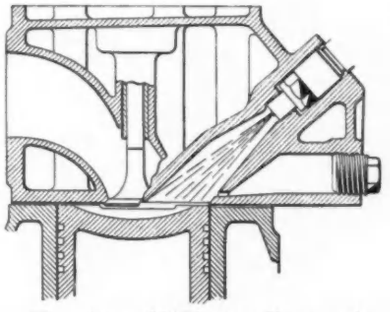


Fig. 18 — MAN air-cell-type of combustion chamber adopted for standardized Army engine

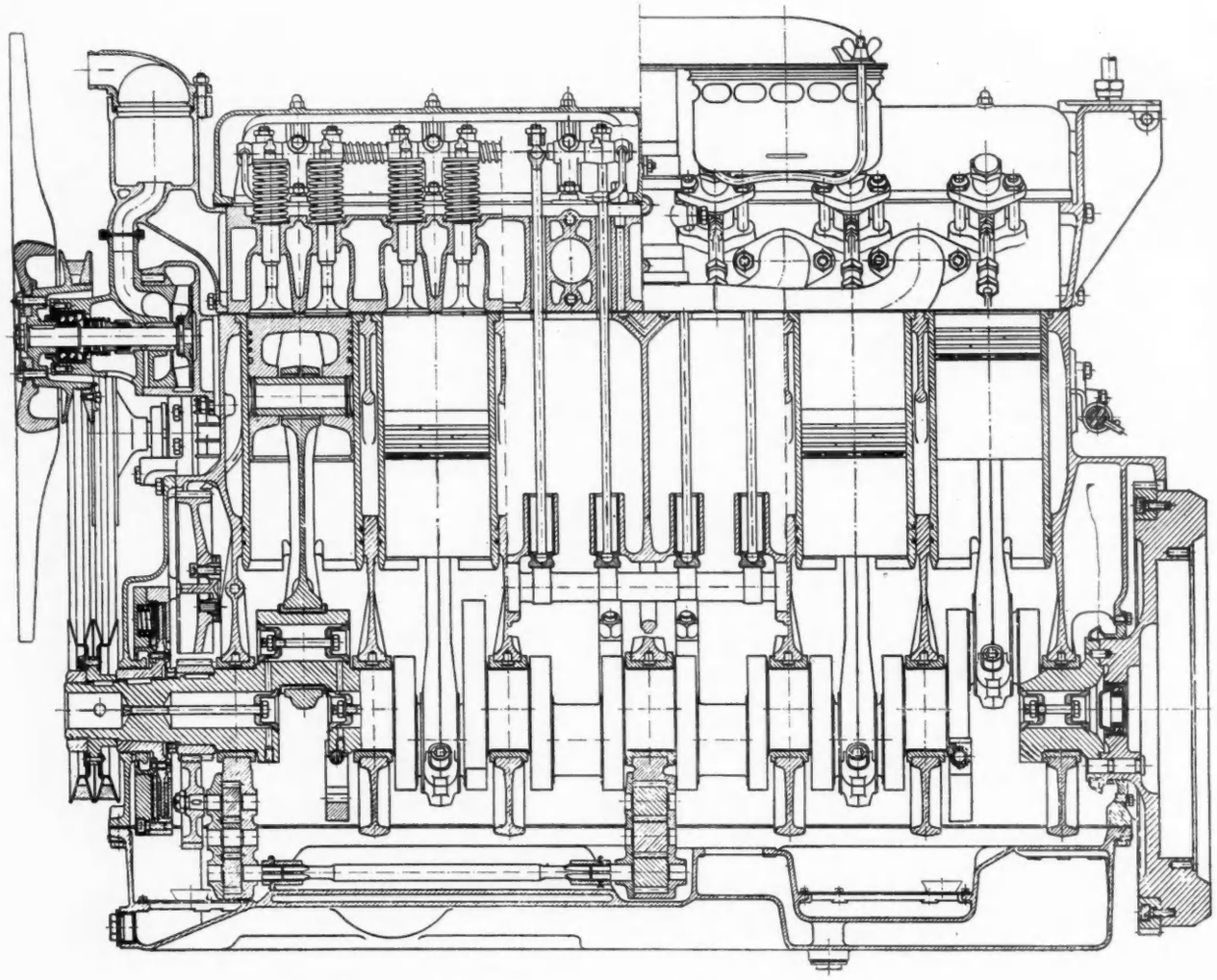


Fig. 20—Longitudinal section of standardized German-Army-truck engine

also with an aluminum bearing alloy. The crankshaft is counterweighted. but only one crank arm of each pair carries a balance weight.

Owing to the necessarily large weight of the moving parts, it was impossible to keep the critical speed of the sixth order outside the operating range, and the engine is provided with a torsion damper on its crankshaft. This damper is of the Lanchester type, but operates in oil and is enclosed in the cam-gear housing, the design being such that it does not add to the length of the engine.

The choice of the combustion-chamber form was determined by the desire of the Army that it should be possible to start the engine from cold without any outside aids, such as electric glow plugs. This made direct injection necessary. The two-stroke, opposed-piston type of engine, which also has good starting characteristics was ruled out for other reasons. It is pointed out that further development of other combustion systems is not hampered by this decision, as all of the parts having to do with the combustion system are combined in the cylinder head, so in case a better system should be developed, a change-over could be readily made. I understand that there was keen rivalry between the leading makers of automotive Diesel engines for the distinction of having their particular combustion system selected for this purpose.

To make it possible to withdraw the pistons and connecting rods through the cylinders, the big end is split at an angle of 45 deg. This has the further advantage that smaller connecting-rod bolts can be used. It is stated that while this type of connecting rod is comparatively new, it has met all expectations in the large number of these engines already in use. The cap is not dovetailed, but tubular dowels are used. The engine has a dry sump-type lubrication system, this being made necessary by the fact that cross-country vehicles may assume inclinations up to 30 deg. in any direction. This system permits of the use of a flat, shallow sump, which makes possible the high ground clearance specified. Oil passes through the hollow camshaft to the rocker-arm bearings.

In order to maintain the volumetric efficiency at high speeds, the valve lift had to be made relatively high, and this led to some trouble

from spring surge. This was largely overcome by giving the springs a new form, the pitch increasing from one end of the spring to the other. The freedom from surge of this spring is said to have been proven by stroboscopic observations.

The engine develops an absolute maximum of 90 hp., and a net (after deduction of the power required to drive accessories) of 83 hp. At maximum output the fuel consumption is 0.53 lb. per hp-hr. At maximum torque the consumption is 0.45 lb. The weight is 1320 lb. Valves have a diameter of 1.65 in. and a lift of 0.4 in. The timing is as follows:

Inlet opens, −18.5 deg., closes, +31.5 deg.

Exhaust opens, −58.5 deg., closes, +18.5 deg.

Main bearings have a diameter of 3.15 in. and a length of 1.61 in., except the center bearing, which has a length of 2 in. Crankpins have a diameter of 2¾ in. and a length of 1.89 in. Piston pin bearings are 1½ in. in diameter.

Railcar engines also have been standardized in Germany to a certain extent. In 1935 a four-wheel railcar equipped with an eight-cylinder horizontal engine was built for the German State Railway. The engine and transmission were mounted on a common drop frame suspended on rubber from the under frame of the car. This under-frame mounting, of course, gives the maximum seating capacity for a certain length of car. The output was 180 hp. at 1500 r.p.m. The State Railway fitted a number of railcars with this engine, including a novel type of observation car. The results obtained led to the design of a larger, 12-cylinder, horizontal-opposed railcar engine, of 275 hp. at 1500 r.p.m. This engine, developed with the assistance of the State Railways, is now being built by four different manufacturers, viz., Daimler-Benz, M.A.N., Humboldt-Deutz, and the German Works at Kiel. Fig. 21 shows one of these engines, built by M.A.N. It has a bore of 5⅛ and a stroke of 7½ in. The engine block consists of two iron castings bolted together in the vertical plane through the crankshaft axis, which are provided with wet liners. One plain and one forked connecting rod connect to each crankpin. Recently a turbo blower has been applied to this engine, and the output thereby boosted to 400 hp. at 1500 r.p.m. Without the blower the specific weight of the engine is 19.14 lb. per hp., while with supercharger it is reduced to 13.42 lb. per hp.

The eight cylinder opposed engine has the disadvantage that complete balance of reciprocating parts can be obtained only by using a single-plane, four-throw crankshaft and firing two cylinders at the same time. That this is not entirely satisfactory is obvious, and it is worth noting that the latest eight-cylinder horizontal railcar engine of the Humboldt-Deutz firm has all eight cylinders on the same side of the crankshaft.

The ideal torque curve for an automotive engine is not a flat horizontal curve, as has often been taken for granted, but a curve which rises as the speed decreases. The torque curve of a Diesel engine is very largely dependent on the delivery characteristics of the pump. If the injection pump for a fixed setting of the control rod delivers more fuel per cycle at low than at high speed, then the engine will have this desirable characteristic of a torque varying inversely as the speed throughout the normal operating range. Naturally, every manufacturer of injection equipment has been striving to give his pump this characteristic, and a number of different expedients have been resorted to. Some years ago the Henschel firm in Germany developed what it called an m.e.p. regulator, which consists essentially of an automatic by-pass in each of the high-pressure fuel lines. As the speed of the engine increases, the pressure in the fuel line increases, and this opens the by-pass valve, through which some of the fuel delivered by the pump is by-passed. At low speeds the by-pass valve remains closed, and the whole of the fuel delivered is injected into the engine. The rights to this control system have been acquired by Robert Bosch Company.

The Bosch company also has developed its pumps in such a way as to improve their delivery characteristics. The change is entirely in the delivery valve, and drawings of the old and new delivery valves are shown in Fig. 22. The valves are of the mushroom type and have fluted stems. In the old stems the flutes were of uniform cross section over practically their whole length, while in the new design the flutes taper toward the top. The valve lift increases with the pressure on the fuel, that is, with the engine speed. When the pressure is relieved by the opening of the relief valve in the pump, there is, of course, a certain return flow through the delivery valve, due to expansion of the fuel and contraction of the pipe. As the valve lift is greater at high speeds, and the cross section increases with the lift, the return flow is greater at high speeds and this is said to give the characteristic of a delivery which increases as the speed of the engine decreases.

A British small Diesel engine is the Perkins, made by F. Perkins, Ltd., of Peterborough. It is of the

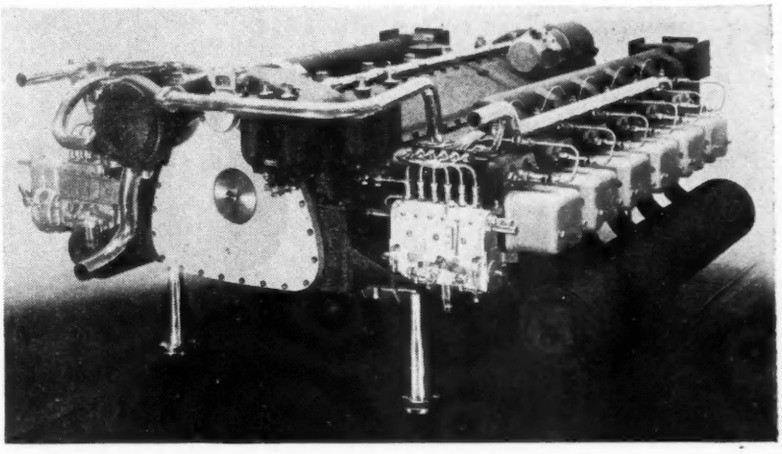


Fig. 21—M.A.N. twelve-cylinder horizontal-opposed railcar engine of 275 hp.

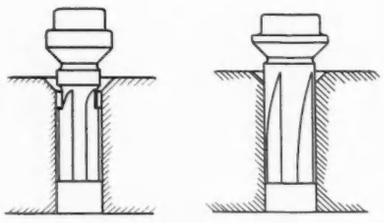


Fig. 22 — Old and new delivery valves of Bosch injection pump

turbulence-chamber type, having a spherical chamber in the cylinder head, into which the fuel is injected. Where the Perkins differs from other engines of the same general type is that the injection nozzle has two orifices from which issue fuel jets in entirely different directions, one jet being directed into the throat of the turbulence chamber, against the incoming air stream, while the other is directed into the chamber, in the direction of the air stream. This double jet is claimed to result in very efficient combustion, because of the uniform dispersion of the fuel in the air charge. The engine is started from cold without the use of heater plugs, and heat losses are claimed to be relatively small.

The camshaft, which is chain-driven, is arranged high up on the side of the cylinder block, and the valve tappets act directly on the rocker arms, so that intermediate side rods are eliminated. This, of course, reduces the valve reciprocating weights and lightens the load on the valve springs.

The six-cylinder engine of 3½ in. bore and 5 in. stroke (288 cu. in. displacement) is rated 85 hp. at 2600 r.p.m., which corresponds to the relatively high b.m.e.p. of 88 lb. per sq. in. The weight of this engine with fan, water pump, electric starting equipment, exhaust manifold, fuel-transfer pump and filters, flywheel and bell housing is given as 712 lb., which seems remarkably light for an engine having a cast iron block. The maximum combustion pressure is given as 750 lb. per sq. in. Fig. 23 is a transverse section showing the form of the combustion chamber, while Fig. 24 is a longitudinal section of the engine.

Development work on aircraft Diesel engines also is proceeding in Europe. The Germans, of course, have the Junkers Jumo IV, an engine of 600 hp. which powered the two seaplanes that made the exploration flights from the Azores to New York last year and also the plane which set a world's long-distance record recently in flying nonstop from Plymouth, England, to Brazil. Besides, they have the 16-cylinder Mercedes engine which powered the dirigible Hindenburg Work is said to be in progress at present on a 2000-hp. Junkers engine, but no details of this engine have come to my attention.

In England, Diesel-type aircraft engines have been built by the Bristol Aeroplane Company and by the Napier firm, which latter has the British rights for the Junkers design. Some years ago there was considerable activity in England along this line, and an altitude record for Diesel-engined planes was established there in 1934 by a plane equipped with a Bristol Phoenix engine. The development work was supported by the government, which later decided not to carry it any further for the time being. Some more fundamental work, however, was continued for the British Air Ministry by Ricardo & Co.

More aircraft Diesel engines seem to be under development in France than in any other country. They include the following:

A two-stroke six-cylinder engine of the Junkers type of 450-500 hp., by the Société Lilloise de Moteurs.

A 12-cylinder, four-stroke, liquid-cooled V engine of 600 hp. at 1800 r.p.m., by Louis Coatalen.

A 14-cylinder, four-stroke, air-cooled, two-row radial, designed by M. Clerget, which is under development in the government engine plant.

A two-stroke radial engine with nine double cylinders, each pair having a common combustion chamber. This is known as the Schidlowsky-Salmson.

A nine-cylinder, two-stroke engine built under license from the Brno Iron Works of Czechoslovakia, by the Société Mécanique Générale.

The Clerget engine under development by the government engine factory has a bore of 5.52 in. and a stroke of 6.30 in. It weighs 1320 lb. and has a specific consumption of 0.396 lb. per hp-hr. The cylinders are water-cooled, whereas the aluminum-alloy cylinder heads are air-cooled.

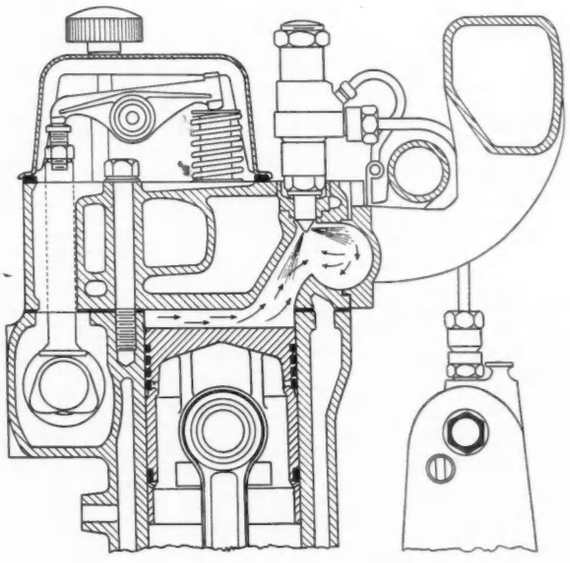


Fig. 23 — Perkins combustion head, showing double-jet fuel spray

A feature of the Coatalen engine (of which a transverse section is shown in Fig. 25) is its common-rail injection system for each row of six cylinders. Fuel is maintained at a pressure of about 10,000 lb. per sq. in. in the common rail. M. Coatalen claims that he obtains very smooth combustion, owing to the high injection pressure used, which is available as soon as the injection valve opens, hence the atomization is very fine from the beginning, and this

cuts down the ignition lag. According to M. Martinot-Lagarde, inspector-general of the French Air Service, writing in a recent issue of *La Technique Moderne*, first tests with the new common-rail injection system showed a decrease in the peak pressure of the order of 300 lb. per sq. in. This reduction in the pressure reduces the stresses on connecting rods and the crankshaft. There is no loss of power due to this reduction in the peak pressure, and it is even claimed that the area of the cylinder diagram is enlarged and the output increased. Martinot-Lagarde, however, recognizes the weak point of the common-rail injection system. Great care, he says, must be taken to insure positive closing of the injection valves, for leakage of fuel into the cylinders between injection periods might result in excessive pressures.

The C.L.M. aircraft engine is a six-cylinder, double-piston engine which delivers its 450 hp. at 1900 r.p.m. It weighs 1100 lb. and has a specific consumption of 0.373 lb. per hp-hr.

Clerget recently has been endeavoring to make this engine smoother in operation and more efficient, by modifying the injection system. He uses a double injection system, that is, two pumps rigidly coupled together. By means of one of these pumps he injects a small quantity of fuel of high cetane number, which reduces the ignition lag; while with the other he injects a fuel containing an admixture of alcohol, which, on account of its high heat of vaporization, keeps down the maximum pressure attained in the engine. A small series of Clerget engines has been completed and is being flight-tested. In these, a double injection of gas oil is employed. The engine at present functions without a supercharger, but it is planned to fit it with one.

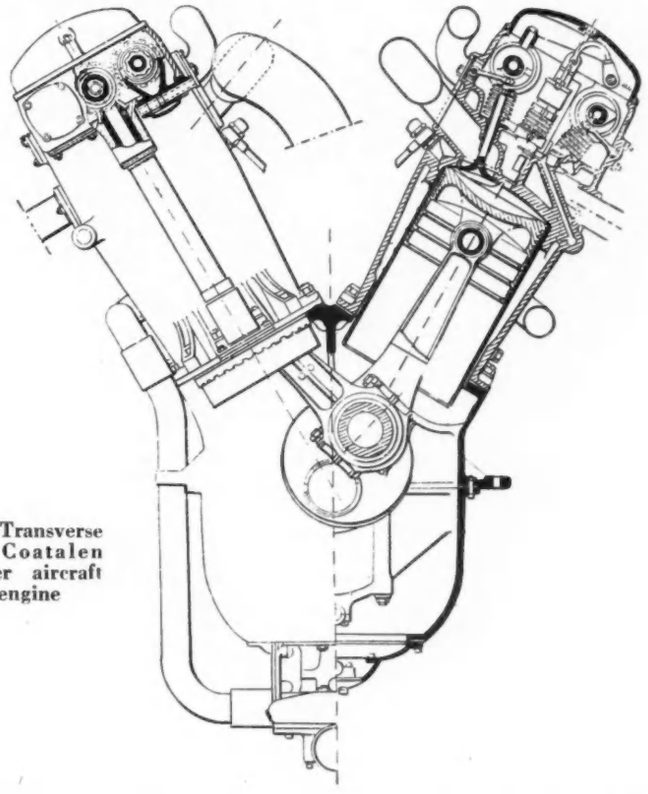


Fig. 25 — Transverse section of Coatalen 12 - cylinder aircraft Diesel engine

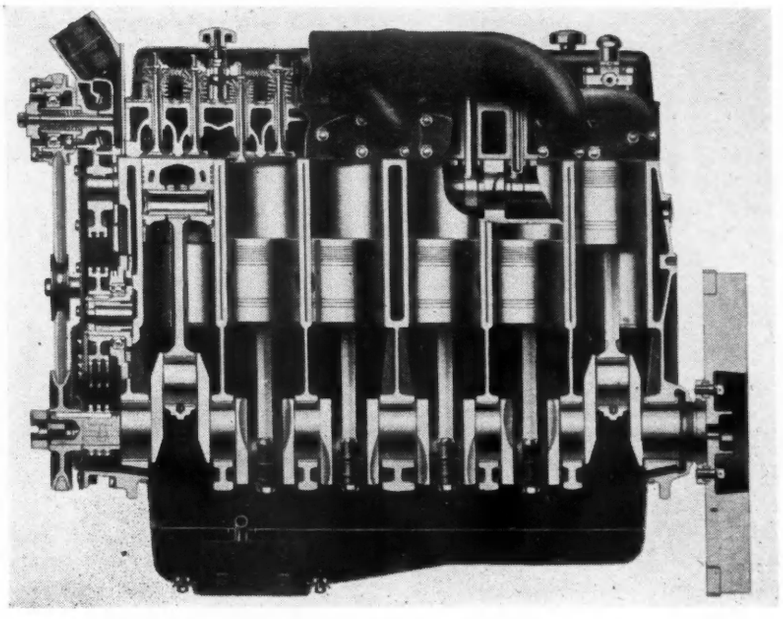
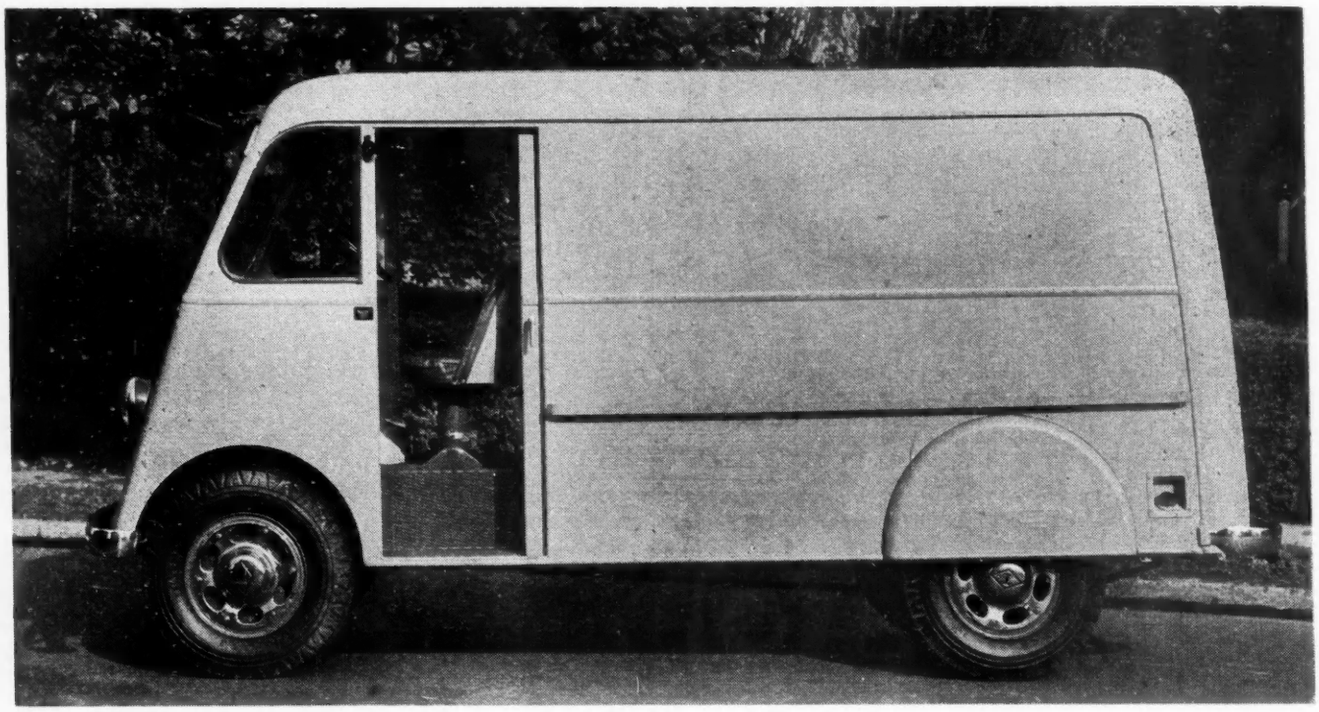


Fig. 24—Longitudinal section of Perkins six-cylinder engine

Owing to the high expansion ratios used, exhaust temperatures are materially lower in Diesel than in carburetor-type aircraft engines, the difference amounting to between 400 and 500 deg. Fahr. In the aircraft Diesels under development in France, higher compression ratios (14 to 18) are used with the two-stroke engines, and the specific outputs on the volume basis (0.25 to 0.41 hp. per cu. in.) are greater. The specific consumption is slightly lower for the two-stroke (0.375 as compared with 0.418 lb. per hp-hr.). The four-stroke engines develop a b.m.e.p. of 100 lb. per sq. in. while that of the two-stroke is only 87 lb. per sq. in. The C.L.M., whose engine block is a light alloy casting that is rather difficult to produce, has a specific weight of 2.42 lb. per hp., while that of the Clerget, which has all structural parts made of steel, has a specific weight of 2.64 lb. per hp.



Diamond T door-to-door delivery truck

Diamond T Offers New Door-to-door Models

AMONG new models exhibited at the national truck show in New York was a new door-to-door delivery wagon by the Diamond-T Motor Car Co. of Chicago. The company is offering three different models of door-to-door delivery trucks, known as Models 231, 332 and 333, which differ in carrying capacity, length of wheelbase, and rear-axle equipment, although all three are powered by the same Hercules six-cylinder 221-cu. in. engine. The three models have nominal chassis weights of 2600, 3000 and 3200 lb., respectively, and the respective gross vehicle weights are 8000, 10,000, and 11,000 lb. All models have a 10-in. single-plate friction clutch and a four-speed transmission. Three axle ratios are offered on the 231 and 332, while only two are offered on the 333. The three optional ratios on the 231 and 332 are 5.14, 5.43, and 6.16, while the two offered on the Model 333 are 5.57 and 6.33. The standard tire size on all models is 6.00-20.

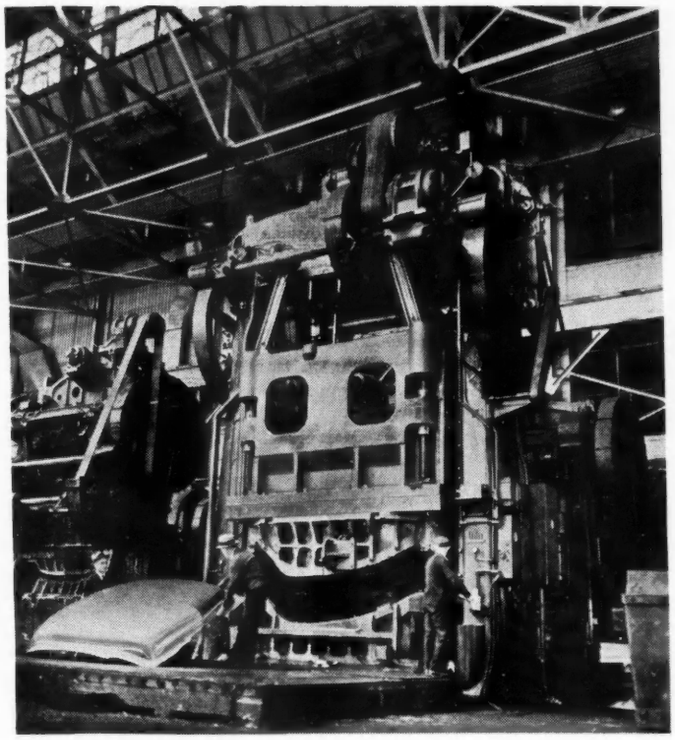
Wheelbases are 119 in., 135 in., and 150 in. on the three models, respectively, and loading-space lengths, 11 ft., 13 ft., and 15 ft. Maximum speeds on level roads range between 40 and 50 m.p.h. Other mechanical units include a cam-and-roller steering gear, metal-spoke wheels, and silico-manganese steel springs. Helper springs are fitted at the rear.

These new trucks are built specially for delivery service, and they offer ample body space in combination with comparatively short wheelbases, which latter make for convenience in handling and parking. Floors are only 26 to 27 inches above street level and the driver steps into and out of the vehicle with little effort. The three models have frames with side rails of different section.

In addition to the regular equipment furnished with these door-to-door delivery trucks the following items are optional at extra cost: Chrome-plated giant hub caps, chrome-plated spring-bar bumper, Duo-Flo oil filter and banjo-type safety steering wheel, with horn ring, wheel and controls finished in maroon.

Methyl Alcohol—$100,000,000

IN a paper contributed to the meeting of the Division of Petroleum Chemistry of the American Chemical Society, Gustav Egloff of the Universal Oil Products Co. made the statement that Europe in 1937 consumed a total of 510,000 tons of power alcohol, as compared with 646,000 tons in 1936. The 510,000 tons of methyl alcohol (including some methanol) represented 4.3 per cent of the total motor fuel consumed in Europe during 1937. Dr. Egloff estimated that the use of this power alcohol cost the consumers and the governments some $100,000,000 in additional expenditures in subsidies, tax losses, as well as higher operating costs of motor driven vehicles.



Top panels at the Hudson plant are produced on this 250-ton press under a pressure of 900 tons.

Production Lines

Cutting Fluids

We are glad to bring tidings of some fine new literature on the subject of cutting fluids that should attract the attention of our associates in this field. First is a leaflet entitled, "Cut-Max" describing the new series of straight cutting oils and bases placed on the market by Houghton. These materials are the fruit of many years of research both in the laboratory and in the field. Second is a sizable booklet, "Cutting Fluids" issued by Tide Water, marking, in their own words, "a new chapter in cutting oil performance." It discusses the cutting process, role of cutting fluids, lists the new Tide Water products. It is significant that both booklets were distributed at the recent National Metal Exposition.

Intricate Shapes

Word comes of a new technique that bids fair to solve some of the most knotty problems confronting engineers and stylists. A method has been devised for producing small forms—precision shapes—in an infinite variety of size and form, in practically every type of metal commercially used in automotive construction. The forms can be held within 0.001 in. for size; wall thickness can be produced down to 0.01 in. One of the most useful functions of special shapes produced by this revolutionary process, is as a backing for plastic inlays for instrument panels, trim, etc. The manufacturer claims to be in a position to supply even short runs, suitable for experimental purposes, at prices far below model shop practice. It seems impossible to stump them on special problems within their province. They are eager to acquaint engineers with the possibilities of the process and we shall be glad, indeed, to get you in touch with them.

Adds Tests

Almost two years ago when the marvelous physical and chemical testing laboratories were opened at the Ford Rouge plant, we published a brief high-spot review of its work and equipment. A more recent visit reveals that numerous new items have been placed in operation since that time. Most interesting of these is the spectrographic laboratory, representing what is said to be the first automotive installation of spectrographic methods of analysis developed by the Departments of Engineering Research and Physics of the U. of M. Even the lab has been mechanized according to Ford ideals, samples of alloy irons from the furnaces being sent there through pneumatic tubes to speed up the work. An appreciation of the efficiency of the apparatus may be gained from the fact that six different samples can be analyzed for six different elements—a total of 36 determinations—in but eight minutes.

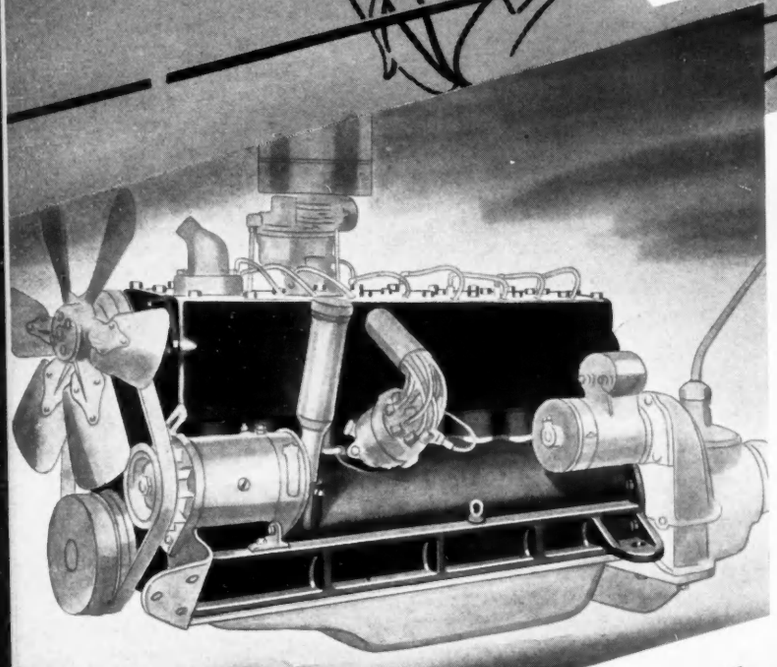
Handling Men

At recent press dinner given by the Dodge Truck Div., both Dan Eddins, president of Plymouth, and C. T. Winegar, director of personnel, Chrysler Corp., stressed human relations as biggest responsibility of management. The stories they tell of typical experiences in every day relations with the workers eclipse in interest the most exciting cases of community social work. Most impressive was the remark by Winegar that when Chrysler Corp., is operating under full steam, practically one person out of every six in the Detroit area comes within its direct influence.

Thermostatic Metal

A few months ago we published a survey of the applications of thermostatic bi-metal in automotive equipment. We have learned just recently that the heart of the switch for the new Stewart-Warner "South Wind" car heater consists of Chace thermostatic bi-metal. This is the new trend and you will see many other similar applications.—J. G.

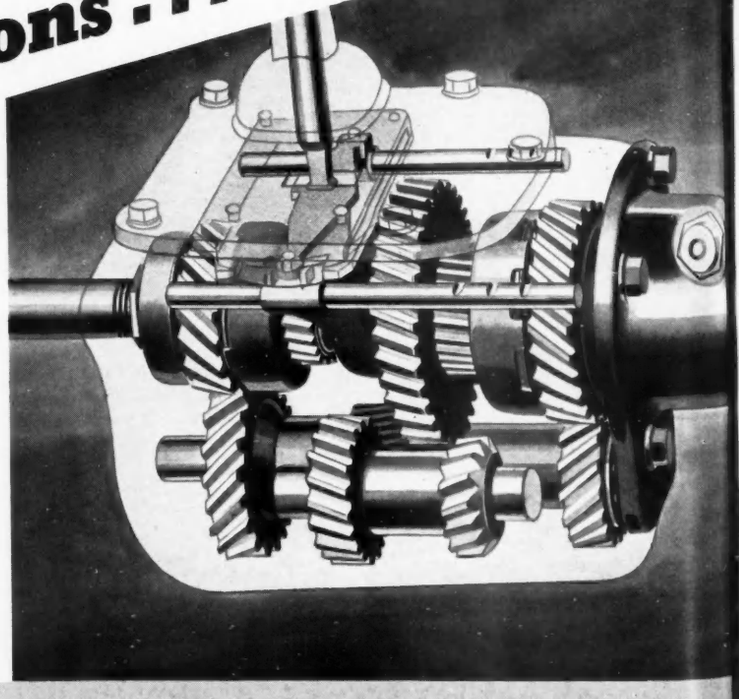
QUIET



Quieter Engines . . . with Silvery Mayari Iron

A relatively small percentage of Silvery Mayari, the natural alloy iron, in the cupola mix makes a block that is denser, more uniform and longer lasting. It can be machined more accurately and at lower cost. Because of its better-wearing qualities, it makes for quieter engines.

Quieter Transmissions . . . with modern alloy steels



Closer tolerances in gears, shafts and bearings are largely the result of modern alloy steels which can be machined to a better surface and heat treated without warping. Bethlehem, with its many years of alloy steel experience, has pioneered many of the steps that led to quieter transmissions.

BETHLEHEM STEEL COMPANY, *General Offices*:-Bethlehem, Pa. *District Offices*: Albany, Atlanta, Baltimore, Boston, Buffalo Chicago, Cincinnati, Cleveland, Columbus, Dallas, Detroit, Honolulu, Houston, Indianapolis, Johnstown, Pa., Kansas City, Mo., Los Angeles, Milwaukee, Nashville, New Haven, New York, Philadelphia, Pittsburgh, Portland, Ore., St. Louis, St. Paul, Salt Lake City, San Antonio, San Francisco, Savannah, Seattle, Syracuse, Toledo, Tulsa, Washington, Wilkes-Barre, York. *Export Distributor*: Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

PLEASE

Quieter Bodies . . . with cold-rolled sheets

Sheets that can stand up to deep draws, that can be formed into one-piece fenders, one-piece tops, body panels of intricate shapes, have made possible today's quieter all-steel welded bodies. A good proportion of such cold-rolled sheets comes from Bethlehem's Lackawanna mills.

Quieter Mufflers . . . with Mayari R Steel

One of the interesting applications of Mayari R, Bethlehem's natural high-strength, corrosion-resisting steel, is in car mufflers and exhaust pipes. With five to six times the resistance to corrosion of ordinary steel, Mayari R is an ideal material for such parts. It lasts longer, contributes its share to quietness.

BETHLEHEM STEEL COMPANY

TOOLS OF TOMORROW

(Continued from page 695)

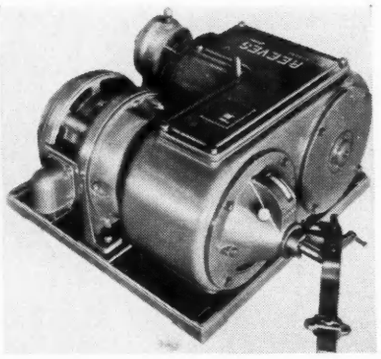
in quantities of two pieces or more. The "Automatic Sizing" control makes possible such work as step-shaft turning, step boring, step facing, or any combination of step, taper, and contour turning, boring or facing work.

Actual time for the complete "set-up" may vary from about 5 min. to 15 min. Since the "set-up" time is so short, states the manufacturer, most lathe work can be more economically done by "Automatic Sizing" even though there are only two or three pieces in the lot, and with the assurance of more accurate duplication of sizes than is practical by manual control of the lathe.

Speed Control

. . . Reeves develops attachment to increase utility of its Motodrive

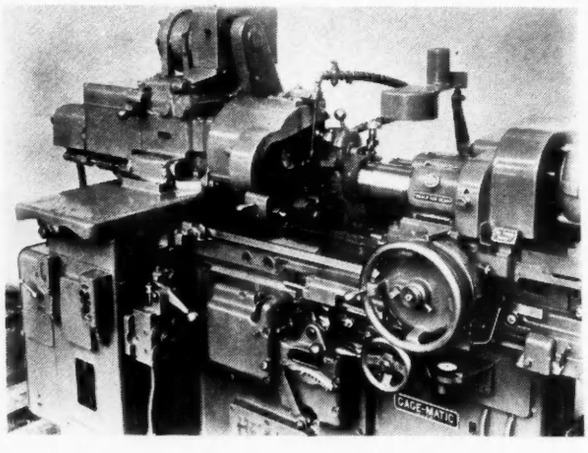
A mechanical automatic control has been developed by the Reeves Pulley Co., Columbus, Ind., for its variable speed control unit known as the Motodrive. The new attachment is said to provide automatic speed regulation of the Motodrive, making possible the synchronization of different machines and separate sections of a single machine; maintenance of constant tension and uniform peripheral winding speeds; and maintenance of uniform pressure, weight, liquid level, temperature and other variable elements.



Reeves Motodrive with mechanical automatic control attachment.

A cover plate over the motor shaft of the Motodrive incorporates a lever bracket and extended lever which may be attached by cable or chain or direct to a compensating or floating roll, pressure regulator, moving carriage or part of machine from which indication of required speeds can be taken. Movement of the lever is transmitted to the speed-changing mechanism of the Motodrive to change its speed in accordance with the indicating movement.

Travel of the lever in either direction is limited by stop screws. The lever may be of any length, as required by the installation, and may be assembled in any one of four different positions.



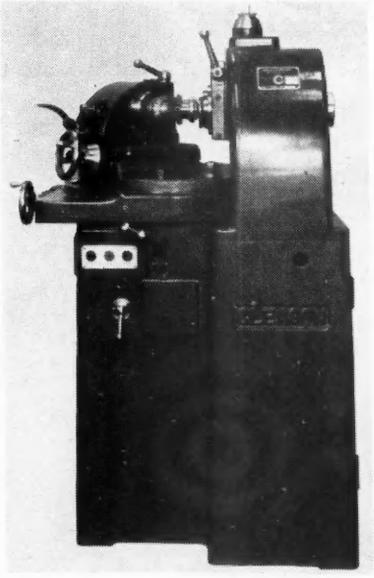
The Heald Machine Co., Worcester, Mass., recently brought out this machine designed for internal grinding and face grinding at the same setting. It is essentially the same as the company's standard Gage-Matic with the difference that two separate wheelheads for both hole and face grinding are mounted on the wheelhead cross slide; the workhead is mounted on a hydraulic cross slide at the end of the machine in order to index the work from hole grind to face grind; and the base has a T-section at the left end to support the workhead cross slide.

Gear Testing

. . . Machine for checking running qualities of bevel and hypoid gears up to 6¾ in. diameter

A rigid testing machine for checking the running qualities of bevel and hypoid gears up to 6¾ in. diameter is a new development of the Gleason Works, Rochester, N. Y. The machine will accommodate all shaft angles from 0 to 180 deg. and pinion shaft offsets up to 1¼ in. either above or below center.

The pinion drive head can be operated in either direction at 1750 and 3500 r.p.m. Load is applied to the gear head by a hand brake, duplicating operating conditions and proving gears for size, spacing, noise, runout and tooth contact.



Gleason machine for checking running qualities of bevel and hypoid gears.

Both spindles are mounted on matched anti-friction bearings—preloaded to eliminate radial or axial deflection which might otherwise be introduced when operating. Spindle noses are heat treated. The taper holes are ground with the spindles mounted in their own bearings to insure absolute concentricity.

SAYLOR-BEALL MFG. CO., DETROIT: *Equipment for painting traffic lines on factory and warehouse floors said to enable an inexperienced operator to lay down from two to four miles of clean-cut line from 2 to 6 in. wide in an hour.*

Internal Gage

. . . Sheffield instrument provides infinite measurement range within its capacity

One of the newest pieces of inspection equipment to be offered is the universal internal measuring machine built by the Sheffield Gage Corp., Dayton, Ohio. The new model N-2 provides an infinite range in the measurement of any size internal diameter within the capacity of the machine. The standard model measures all internal dimensions from ⅝ in. to 6 in. against a master or precision block setting. Other models are available for other size ranges.

Two fingers, each carrying a measuring point, and both adjacent to a vertically traveling work rest plate, are combined in design to permit full exploration and determination of the dimensions of a hole at any point on its internal surface within the 1½ in. depth-range of the gage.

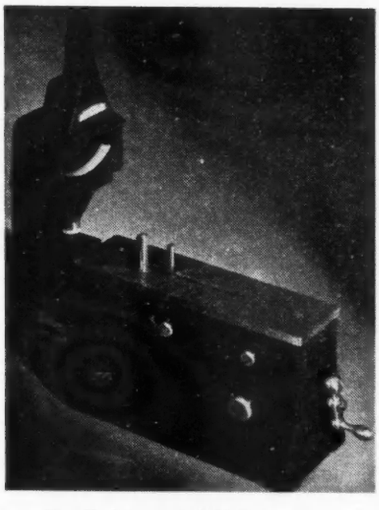
In the new design the so-called fixed gaging point floats on vertical reeds with a fixed relation to the reed pivot which transfers the motion of the adjustable gaging point to the visual gage. Therefore, only a variation in the distance between the two gaging elements will vary the visual gage reading. In addition, there is always gaging pressure only, on both sides of the hole being checked, irrespective of the operator's touch on the part being measured.

Tapping Machines

. . . Procunier Safety Chuck Co. announces new high-speed line

A recent addition to the line of tapping machines made by the Procunier Safety Chuck Co., Chicago, is the new high-speed "Universal" which will accommodate a large range of tap sizes. One machine handles tap sizes from No. 2 to 5/16-in. in steel, ⅜-in. in cast-iron, and ½-in. in brass, through the use of two interchangeable Procunier high-speed precision tapping heads. An enclosed V-belt drive provides four speeds, 390, 745, 1280, and 2050 r.p.m.

The foot operating mechanism allows an operator complete use of both hands for handling parts. Long spiral compensating springs incorporated in this mechanism provide a uniform pressure on the tap both in driving and backing out; also compensate for the difference between the travel of the foot and the lead of the tap. Thus the tap establishes its own lead, and tapped holes can be held to an accurate fit. This feature provides for pre-set tap feeding and reversing pressures which are adjustable to meet the requirements of the tapping job. Compression spring adjustments are made from the operator's position.



Sheffield model N-2 internal gage.

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This is one of a series of advertisements showing some of the applications of "dag" colloidal graphite - best known in the automotive industry for its use in assembly, run-in and the lubrication of auto engines.

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"See, I told you it was too short—he distinctly said your skirt had too much clearance!"

MOTOR AGE, September, 1938 37

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